IES
PRS

Application Profile

Application Number: R372A05149

Competition: 84.372A05 **Date Entered:** 6/30/2005

Organization Information

Organization Name: Connecticut State Department of Education

Organization Unit: Bureau of Research, Evaluation and Student Assess

Organization Address: 165 Capitol Avenue

Hartford, CT 06106 **Country:** United States of America

Project Director Name and Information

PD Name: Dr. Robert Lucco

PD Address: 165 Capitol Avenue

Hartford, CT 06106 **PI Country:** United States of America

PD Phone: 860-713-6875 **PD Fax:** 860-713-7032 **PD E-mail:** robert.lucco@po.state.ct.us

Collaboration Organization(s)

Organization Name	Organization Type	State	Country	Key Personnel	Role on Project
University of Connecticut Health Center	Public College or University	CT	United States of America	Aseltine, Robert	Project Director of the Connecticut Health Information Network
				Cooney, Patrick	Application Developer for the Connecticut Health Information Network
Arizona Department of Education	State	AZ	United States of America	McGoldrick, Janice	Arizona Project Manager
Maine Department of Education	State	ME	United States of America	Hurwitch, William	Maine Project Manager

Application Title

The Connecticut Department of Education Statewide Longitudinal Data System

State Identifier To be determined

Period of Performance **Project Begin Date:** 11/01/2005 **Project End Date:** 11/30/2008

Abstract

The Connecticut Department of Education Statewide Longitudinal Data System

Since the development of the student tracking database in 2003, the Public School Information System (PSIS), the department has undertaken several initiatives intended to position its technology base to meet increasing data reporting requirements and the demand for data-driven decision support.

In 2005, Connecticut deployed an enhancement to PSIS and issued a unique identification number to each student in the database. Additionally, PSIS data elements were re-defined to adopt the standards published in the National Center of Education Statistics (NCES) Student Data Handbook. In the fall of 2005, the department will deploy an identity management process to provide secure network access to department staff, teachers, administrators, policy makers, students, parents, and researchers.

Governor Jodi Rell and Education Commissioner Betty Sternberg have embraced and supported these efforts with several funded technology projects. Governor Rell has approved $5 million of funding in 2006 and $4.8 million of funding in 2007 for the Connecticut Education Network (CEN) to wire each district and school in the state. In addition, Commissioner Sternberg has championed a lap-top computer initiative and has

secured $1.5 million of funding for the purchase of laptop computers to be distributed to schools within the state.

With this technology infrastructure in place, Connecticut is now ready to enter the most important phase of its maturing technology base; the specification and architecture of an enterprise-wide longitudinal data strategy. Connecticut has taken the approach that by using sound architectural guidelines to author enterprise-wide business requirements, all technology projects will be developed in harmony with the main objective: the efficiency of the longitudinal data enterprise.

Connecticut is requesting grant funding to support the recent strides gained in the broadening of its technology infrastructure. These enhancements are defined in detail in the grant proposal and include: the development of an enterprise-wide data dictionary; the specification and development of an enterprise-wide data storage facility; the development of data marts and decision support cubes; a collaboration with the University of Connecticut Health Center to create an environment that allows shared access to health and education information across state agency databases for researchers, policy makers, and government officials; and a collaboration with Arizona and Maine to develop horizontal and vertical reporting models.

Throughout the development and deployment phases, Connecticut will work closely with the states of Arizona and Maine. Our states have been collaborating since 2004 as members of the Chief Council of State School Officer's Decision Support Architecture Consortium. To respond to this grant we have spent several hours of state-to-state analysis defining common goals relative to the expansion of each state's current technology base and the importance of persistent data.

Additionally, the three states are using a common architecture, Microsoft's Active Directory, Sharepoint, .NET and SQL. A relationship would therefore commence facilitating the sharing of analyses, documentation and source code among our states, not only during the development process, but more importantly long after the grant funding has expired.

Human Subjects:	No	Exempt from Regulations:	No	Exemption #:		Assurance #:	

Exempt Narrative:

Non-Exempt Narrative:

Estimated Funding

Federal:	$1,500,714.00	Local:	$0.00		
Applicant:	$0.00	Other:	$0.00	Total:	$1,500,714.00
State:	$0.00	Program Income:	$0.00		

Federal Budget

Budget Categories	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1. Personnel	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
2. Fringe Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3. Travel	$0.00	$10,000.00	$0.00	$0.00	$0.00	$10,000.00
4. Equipment	$0.00	$30,000.00	$0.00	$0.00	$0.00	$30,000.00
5. Supplies	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
6. Contractual	$442,500.00	$970,950.00	$15,000.00	$0.00	$0.00	$1,428,450.00
7. Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
8. Other	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. Total Direct Costs	$442,500.00	$1,010,950.00	$15,000.00	$0.00	$0.00	$1,468,450.00
10. Indirect Costs	$14,282.00	$16,872.00	$1,110.00	$0.00	$0.00	$32,264.00
11. Training Stipends	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
12. Total Costs	$456,782.00	$1,027,822.00	$16,110.00	$0.00	$0.00	$1,500,714.00

Non-Federal Budget

Budget Categories	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1. Personnel	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

2. Fringe Benefits	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
3. Travel	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
4. Equipment	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
5. Supplies	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
6. Contractual	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
7. Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
8. Other	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
9. Total Direct Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
10. Indirect Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
11. Training Stipends	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
12. Total Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Application Details

D-U-N-S Number:	(b)(2)	T-I-N:	06-6000798	Duration (years):	3
Any Federal Debt:	No	Specify:			
Type of Applicant:	State	If Other, Specify:			

Authorized Representative Information

AR Name	AR Address	AR Phone	AR Fax	AR E-mail	Primary:
Mr. Mark Vocca	165 Capitol Avenue Hartford, CT 06106 United States of America	860-713-6879	860-713-7032	mark.vocca@po.state.ct.us	Yes

1. Need for the Project

Current Capacity/ Required System Components

Unique, Permanent Student Identifier

Connecticut's Public School Information System (PSIS) was expanded in the spring of 2005 to include a 10 digit State Assigned Student Identifier (SASID) and a student Register/Unregister function. Additionally, each PSIS element was re-defined to incorporate the definitions published in the National Center of Education Statistics (NCES) Student Data Handbook and School Interoperability Framework (SIF) metadata specifications.

PSIS is now comprised of two components:

- *Register/Unregister*

  Each student enrolled in a Connecticut local education agency (LEA) is registered in PSIS and assigned a student identifier. A district must register a student prior to submitting data collection elements during the three collection periods. As a student exits a district, whether it be in the form of graduation or a transfer to another LEA, or leaves the state or country, the LEA is required to exit the student from the active registrants list.

- *Data Collection*

  LEAs submit data on their registered students three times during the school year: October 1st; Pre-Assessment (late January/early February) and; end of school year.

Limitations of PSIS

- At present, the data are stored in separate stovepipe databases from collection to collection;
- There are no temporary, operational or persistent data stores;
- While the ten-digit identifier has dramatically improved the quality of data, more could be done to assist the process of error/case management between the department and the districts;
- The ten-digit identifier was not developed to facilitate use by researchers outside of the department;
- The PSIS elements are defined in a descriptive and technical format, but have yet to be analyzed and defined in a thorough data dictionary; and
- While the PSIS elements were developed in accordance with NCES and SIF standards, a SIF zone is not in place to accommodate interoperability.

Grant funding will allow PSIS to be expanded to include:

- The development of a data dictionary to serve as a conclusive meta-library for each collected and reported element.
- The specification and development of a persistent data storage facility for all identifier, demographic and collection data;
- The integration of the Schools Interoperability Framework (SIF) data standards;
- The development of a SIF model for agents; and
- The development of secondary and tertiary identifiers and one-way hash transformations to facilitate the sharing of data among the research community and other state agencies.

Enterprise-Wide Data Architecture

Connecticut's tendency has been for department staff to collect and manage specific program data in stovepipe databases. Each collection was spawned in reaction to a specific legislative mandate or policy priority. At present, thirteen mandatory collections are used to fulfill specific state and federal mandates. These collections include: End of Year School Report; Reducing Racial Ethnic and Economic Isolation; Fall Hiring Survey; Certified Staff Data Form; Graduating Class Report; Student Mobility Data Collection; Non-Certified Staff; and Disciplinary Offense Report.

Additionally, there are several stand alone database applications that manage: No Child Left Behind AYP Analysis; Title 1; Special Education IDEA Requirements; Adult Education Students; GED Testing; Child and Adult Food Care; Free and Reduced Lunch; School Readiness; and Family Resource Centers.

Limitations of the Current Data Collection Model

- At present, collected data are stored in stovepipe databases and are not conducive to longitudinal analysis;
- Data are often not returned to the LEA for analysis and in instances where the data are returned it is not in a timely manner;
- There are no temporary, operational or persistent data stores designed to share common data among users;
- The ten-digit identifier was not developed to facilitate use by researchers outside of the department;
- The collected elements in the Student ID application (PSIS) are defined in a descriptive and technical format, however, data across the enterprise have yet to be comprehensively documented and defined in a data dictionary; and
- Many of the data collections continue to be aggregate and self-reported.

Grant funding will allow the Data Collection Model to be expanded to include:

- The development of a data dictionary to serve as a conclusive meta-library for each element collected on behalf of the department;
- The specification and development of a persistent data storage facility for all identifier, demographic and collection data;
- The development of an operational and persistent data storage facility for student-level statewide assessment performance records and item level responses, curriculum frameworks and formative assessment items;
- The development of facing applications used to disseminate data from the persistent data stores to the LEA, district, school, student, parent and public level;
- The migration of legacy database applications to enterprise ready operational databases; and
- The integration of SIF data standards and SIF agents.

Security

For the last five years, the department has issued user rights to each district through a Microsoft (MS) Windows NT environment. Each LEA is granted one password to be shared among their users. With the development of the Student ID application (PSIS) and the requirement of the LEA to Register and Unregister students, it became clear that the department's network identity protocols would require re-engineering.

In the spring of 2005 the department drafted requirements for their LDAP (Lightweight Directory Access Protocol). The LDAP defines roles within the department, and at the LEA and service provider level. The department is in the final stages of purchasing MS Active Directory to manage the network and provision role-based identities beyond the district level and reach the school and classroom. Additionally, the department is procuring the necessary MS Sharepoint licenses to create a single sign-on data portal to offer a secure front-end to content made available for dissemination. The department has been allocated three full-time staff positions to manage the Active Directory and Sharepoint requirements.

Limitations of the Security Framework

- Only one user account is distributed to an LEA, thus, true session management can not be realized;
- Passwords are centrally provisioned at the department;
- Database applications do not rely on a role-based identity standard and can only be deployed to the LEA central office. Thus, more granular data collections are not deployed to the most appropriate user set. Moreover, the

end results of data collected are not disseminated back to the populations that make day-to-day decisions;

- After the purchase and installation of MS Active Directory and Sharepoint, there will be a steep learning curve for both department and district users; and
- Database developers do not have a department standard for the various access roles for applications within the enterprise.

Grant funding will allow the Security Framework to be expanded to include:

- The Data Dictionary will specify which access roles within the enterprise are authorized to view and update data;
- The continued development of role-based application identity management solutions; and
- The training LEA staff on the process of identity management and password provisioning.

Schools Interoperability Framework (SIF)

In 2005, during the development of the Student ID (PSIS) database, all elements were defined using the SIF Framework. Additionally, the elements were reconciled to the NCES Student Data Handbook.

The department has specified a SIF class in the nodal structure of the Lightweight Directory Access Protocol (LDAP). The definition of the SIF class allows for the retention of specific permissions for each entity recognized by the directory and the eventual federation of data among those entities.

Limitations of the SIF Framework:

- While the student level elements are defined as SIF objects, a Zone Integration Server (ZIS) has not been procured; and
- Policy on the sharing of data using SIF agents has yet to be defined. The policies would need to be defined at all levels of collection and transmission.

Grant funding will allow the Schools Interoperability Framework to be expanded to include:

- The development of a SIF Zone and agents to federate vertical data transmission from two pilot districts within the state;
- Collaboration with Arizona and Maine to develop SIF agents to pilot a state-to-state horizontal reporting model;
- Collaboration with Arizona and Maine to develop SIF agents to pilot a state-to-USDE vertical reporting model; and
- The definition of policies and procedures to jury the functionality of SIF.

Data Warehouse

The re-engineering of student-level data collection process to include a student identifier made possible the development of a data warehouse initiative. The identifier will be the thread that connects the elements collected on each student in the Student ID database (PSIS) to other data collected by the department. For example, stovepipe databases managing assessment scores and responses can be re-designed to facilitate data storage in back-end databases, and the data can be connected to the demographic data collected by PSIS.

The department has a wellspring of aggregate data collected through the years that if properly organized could be immediately disseminated using the district, school and facility indexing convention as its relational identifier.

Limitations of the Data Warehouse:

- The collected elements in the Student ID database (PSIS) are defined in a descriptive and technical format, however, data across the enterprise have yet to be comprehensively documented and defined in a data dictionary;
- At present, collected data are stored in stovepipe databases and are not conducive to longitudinal analysis;
- Data are often not returned to the district for analysis and in instances where the data are returned it is not in a timely manner;
- There are no temporary, operational and persistent data stores designed to share common data among users; and
- While the ten-digit student identifier has dramatically improved the quality of data, the ten-digit identifier was not developed to facilitate use by researchers outside of the department.

Grant funding will allow the Data Warehouse to be expanded to include:

- The development of a data dictionary to serve as a conclusive meta-library for each element collected on behalf of the department. The data dictionary would be the roadmap for the development of a data warehouse;
- The development of facing applications used to disseminate data from the persistent data stores to the district, school, student, parent and public level; and
- The development of secondary and tertiary identifiers and one-way hash transformations to facilitate the sharing of data among the research community.

Map of Core Elements

The following outlines the core elements, as defined by the grant, and the current status of each relative to the Connecticut statewide longitudinal data system:

c. Allowing for student record transfers among States when students move across state borders (requiring inter-state agreements and compliant with FERPA regulations)
Planned

5. Planning and implementing data collection

a. From districts and/or schools so that the SEA can incorporate data in the system for all students, classrooms, and schools under the SEA's jurisdiction, including:

i. Development of collaboration among all parties within the SEA and between the SEA and school districts in data collection, reporting, and dissemination

ii. Provisions for the needs of districts that have limited ability to participate in technology systems
Currently deployed and in process

b. Conducting cost/benefit and sustainability analyses of dynamic vs. static data extraction systems (data entered directly by school personnel into the statewide system, with instantaneous error feedback vs. data files imported from districts on a periodic basis)
Planned

c. Shortening reporting time and increasing the accuracy of student assessment data (e.g. through technology-based assessments)
In Process

6. Implementing statewide longitudinal data system (warehouse)

a. Development of the system according to the designed architecture

b. Testing of the system

c. Going live
Planned

7. Designing, using, and maintaining business intelligence tools (analytical & reporting)

a. Streamlining reporting capabilities to local, state, and federal agencies, using pre-defined, automated reports (including for EDEN, NCLB, NCES, and the public)
Planned

b. Supporting:

i. Multiple reporting and analyses needs of different stakeholders

ii. High-level longitudinal analyses, required for data-driven decision-making by policymakers, educators, and members of the public
In Process

c. Providing timely, accurate, and user-friendly dissemination of the needed data, reports, and analyses results to:
In Process

d. Engaging in longitudinal education research to inform policy and decision-making
In Process

e. Leading the State, districts, and teachers in the development and use of innovative analytical tools and reports to inform policy and decision-making
Planned

8. Establishing logistical capacity to create and maintain a statewide longitudinal data system

a. Developing efficient administrative processes, infrastructure components, and policy commitments for effectively implementing the maintenance of the statewide longitudinal data system, regarding:
i. Assuring continued data collection and quality
ii. Assuring continued dissemination of data and analyses results
iii. Assuring data security and confidentiality, including addressing potential concerns of stakeholders about student privacy in automated systems
iv. Assuring continued funding
v. Assuring continued adequate human resources
vi. Assuring continued enabling legislation
vii. Assuring the continued adequacy of hardware, software, and networking capabilities
Planned
b. Assuring sustainability and effectiveness of the system by:
i. Assuring administrative buy-in
ii. Assuring qualified staff, training, technical, and other resources dedicated to the State's administrative technology over the long term to ensure the system's continued effectiveness (including the commitment and ability of staff to implement, use, and continually develop the data system)
iii. Developing a strong plan for the SEA and other stakeholders to continually evaluate and improve the effectiveness of the data system and of associated processes, both in their reporting and decision-support functions, and to periodically assess the degree to which they meet agency and other stakeholders' needs
Planned
c. Involving and supporting stakeholders by establishing and/or facilitating the existence of:
i. A policy advisory committee that includes representatives from each key stakeholder group
ii. A data provider/collection group
iii. A data user group
iv. An internal agency coordination group to oversee data collection, management, and dissemination
All projects are currently subject to this oversight
d. Planning and funding initial and ongoing, efficient and effective training of key state and local data collectors and users, according to their functional needs, on:
i. Data Entry, Cleaning, and Transfer
ii. Data Extraction
iii. Unique Student ID System
iv. Business Intelligence Tools
Currently deployed and in process

2. Project Design

Components Addressed Through This Grant

The Connecticut Department of Education is seeking grant funding for the following activities to enhance the longitudinal capacity of its enterprise infrastructure:

1) Collaboration with Arizona and Maine to develop a data dictionary to serve as a conclusive meta-library for elements collected on behalf of the department;
2) The specification and development of an enterprise-wide Persistent Data Storage Facility;
3) The development of data marts, facing applications and decision support cubes used to disseminate data from the persistent data stores to the district, school, student, parent and public level;
4) A collaboration with the University of Connecticut Health Center, to develop a longitudinal research data warehouse, federating de-identified data from the Connecticut Departments of: Education; Children and Families; Public Health; and Mental Retardation;
5) Collaboration with Arizona and Maine to develop SIF Zones and SIF agents to pilot horizontal and vertical reporting models; and
6) Provide training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning.

1) Collaboration with Arizona and Maine to Develop a Data Dictionary to Serve as a Conclusive Meta-Library for Elements Collected on Behalf of the Department

The Connecticut State Department of Education is planning a collaborative with the Departments of Education in Arizona and Maine to develop a Data Dictionary. The dictionary will model the NCES Student Data Handbook and be a conclusive meta-library for each element collected by the department. Additionally, the dictionary will provide consistent definitions for the LEAs, database developers and School Information System (SIS) vendors.

This component is considered the highest priority in this grant application, as the dictionary will be the sole reference source for the data warehouse architecture and subsequent projects.

At minimum the dictionary will provide the following metadata on each element:

- element name;
- NCES Student Data Handbook standards;
- SIF metadata crosswalks;
- Education Data Exchange Network (EDEN) crosswalks;
- Common Core of Data (CCD) crosswalks;

- ISO/IEC 11179 and Dublin Core metadata specifications;
- data type;
- security classification;
- related elements;
- code formats;
- inter-element validation details;
- database table references;
- application domain definitions;
- data sources;
- historical and external references;
- quality control references;
- local, state and federal policy references;
- validity dates; and
- entity/user LDAP relationships.

The dictionary will document each element using an indexing convention and be housed in a case management application. The case management application will provide create, read, update and delete functionality to facilitate the maintenance of the dictionary. The case management application will also include the following registry services:

- *Data Sources & Services Registry* – This registry will provide a searchable directory of data sources, agency contacts, and services available within the enterprise. It will provide descriptive information about the data sources to end-users searching the registry and serve as the authoritative source for services (i.e. the data processing engine) looking for connection information to those data sources; and

- *Data Elements Registry* – The registry will house the published data definitions contributed by each data source. It will provide the definitions as a searchable catalog, as well as organize data definitions hierarchically for browsing. The Connecticut Education Data and Research (CEDAR) interface will use this data definitions catalog for building query statements. The registry will integrate the data definitions catalog with standardized vocabularies.

2) The Specification and Development of an Enterprise-wide Persistent Data Storage Facility

Using the data dictionary as a guiding document, the department will architect and build a persistent data layer to fulfill the requirements of a data warehouse. The components of this activity are as follows:

- *Enterprise-wide Data Management Schema* – The schema will:

- be developed and documented in an industry standard case tool and rely on Joint Application Development (JAD) strategies to facilitate participation among the stakeholders in the enterprise;
- identify the requisite objects and elements and document their relation and inter-dependency to the data storage, domain object, presentation and persistent layers; and
- be presented in both a traditional schema metaphor for each relational layer and a star or consolidated dimensional hierarchy for the persistent layers.

- *Enterprise-wide Data Management Specification* – The specification will:

  - define the business and functional requirements of each layer documented in the data schema and the data dictionary;
  - outline the technical processes for data extraction, staging, data verification, cleansing, consolidation and delivery; and
  - address the policies and procedures governing each of the objects/elements defined in the schema.

- *The Deployment of an On-going Operation and Maintenance Strategy*

  - outline the short and long term data management objectives of the enterprise, the strategic plan to attain those objectives, the obstacles that may impede the attainment of the objectives and performance indicators to measure performance to the objectives;
  - document a strategy for future planning, forecasting and budgeting for the warehouse and the on-going management of each layer in the enterprise with particular emphasis on data integration and integrity;
  - document the support processes required to maximize the reliability of the infrastructure as well as a process for future planning, forecasting and budgeting for the warehouse;
  - document the department's staffing roles associated within each layer of a multi-tier infrastructure;
  - document the training processes required to ensure that stakeholders are able to leverage the investment in the data warehouse to its fullest extent.

- *The Pilot Deployment of an Enterprise -wide Persistent Data Facility*

  Using the layers outlined in the Data Management Schema and Specification, build a pilot persistent data facility. The pilot will adopt the "lessons learned/proof of concept" approach and validate the schema and specification while mitigating the risks associated with full deployment. It will also serve as a way to build credibility and support for the data warehouse initiative. The pilot will be a short-term 60 to 90 day project and will include the following:

- the deployment of a scaled-down version of the data warehouse architecture in a single technical environment;
- the utilization of standard data warehouse tools;
- a multi-tier infrastructure for each layer;
- the implementation of a scaled-down data acquisition plan from two sources; and
- the implementation of a scaled-down data delivery plan from an object considered value-added or of high priority.

- *The Deployment of an Enterprise -wide Persistent Data Facility*

  Using the documented best practices gained from the pilot and each of the developed components listed above, produce a Request For Proposal (RFP) for the construction and deployment of an enterprise-wide persistent data facility.

  The deliverables from the contract will be comprised of the following:

  - the re-engineering of the Education Directory to include a temporary, operational and persistent data mart. The redesigned directory will be the source of all entities within the enterprise;
  - a temporary, operational and persistent data mart for the Student ID database (PSIS);
  - an Assessment Score data mart to facilitate Annual Yearly Progress (AYP) analysis and the dissemination of No Child Left Behind (NCLB)Reports;
  - an Assessment Released Item data mart; and
  - a Curriculum Frameworks data mart.

  Connecticut will make the source code and/or documentation of these deliverables available to any state or educational entity who may find value in the chosen approach.

3) The Development of Data Marts, Facing Applications and Decision Support Cubes to Disseminate Data from the Persistent Data Stores to the LEA, School, Student, Parent and Public Level

Using the upgraded data facilities (as outlined in Component 2), the department will re-engineer existing databases to provide more streamlined data collections, more reliable data, and an infrastructure designed to securely share those data with LEA staff, students, parents, the research community, state agencies, collaborating states (Arizona and Maine), and the United States Department of Education (USDE).

The engineering/re-engineering process for each project outlined below will begin with the writing of business and functional requirements for each tier of the database. The requirements will be developed and documented in an industry standard case tool, relying on Joint Application Development (JAD) strategies to facilitate

participation among the NCLB stakeholders. Connecticut will make the source code and/or documentation of these projects available to any state or educational entity who may find value in the chosen approach. The end result of the requirements documents will be a Request for Proposal (RFP) for each component.

Included in each RFP will be the development of varied web-parts for administration, data loading, and security integration of each data mart.

- *Enhance the Education Directory* – At present the department maintains a SQL/web-based directory deployed to each LEA to manage staff and facility data. The directory was built on a limited budget and though it has streamlined data entry by providing access to the LEA, it has flaws inherent in the design. The primary focus will be to enhance the current database structure to tie into the Microsoft Active Directory and provide the following functionality:

    - build a Directory Administration (DA) function tied to MS Active Directory and deployed to department staff with the authority to recognize and validate entities within the enterprise;
    - build a DA function allowing LEA staff to provide information about those entities; and
    - build a DA function deployed to both SEA and LEA authorized staff for provisioning network identity to users within the enterprise.

- *Assessment Results Database* – With the advent of the student identifier (SASID), it is now possible to relate the scores from a state assessment to more granular student demographic data. The state has two assessments: the Connecticut Mastery Test (CMT) which is administered to students in grades 4, 6, and 8; and The Connecticut Academic Performance Test (CAPT) administered to students in grade 10. Beginning in 2006 the CMT will be expanded to include the testing of students in grades 3, 5 and 7.

  The database would enhance our existing assessment results dissemination website contracted to eMetric Solutions and disseminated through the www.CTReports.com website. The assessment results data are currently disseminated to teachers in paper form but by means of this application, would be presented in secure web form.

  Since state assessment scores hold the key to NCLB accountability, State Education Agency (SEA) and LEA decision making and policy, and program research, the department will build a secure data mart designed to store assessment data and provide the following functionality:

    - development of temporary, operational and persistent data marts for assessment scores and item-level responses for each student tested in Connecticut;

- a link to the Education Directory to ensure assessment scores are related to the accountable LEA;
- a link to the Public School Information System (PSIS) to ensure assessment scores are related to the appropriate student;
- through a security portal, provide student-level assessment data for review by the appropriate LEA staff whose roles are identified in the LDAP security framework;
- through a security portal, pilot a parent dissemination assessment score website;
- provide the linkage of assessment scores to existing databases such as the English Language Learner, Disciplinary Offense and Special Education databases; and
- provide the linkage of de-identified assessment scores and student demographics to the research community, and pilot the first deployment with the University of Connecticut Health Information Network.

- *No Child Left Behind (NCLB) Database* – Using the Assessment Results data marts and the link to PSIS, the department's Accountability Unit in the Bureau of Research, Evaluation and Student Assessment will be provided a database with the following functionality:

  - data drawn from persistent sources (PSIS and Assessment Results) and updated in a timely manner to facilitate AYP analysis;
  - a secure database deployed to the appropriate LEA staff allowing the user to reconcile test-takers, and the demographics of those test-takers, accountable to their respective LEA;
  - the electronic dissemination of NCLB school and district reports to authorized LEA staff;
  - the development of an electronic appeal process using the Active Directory messaging interface to facilitate threaded communication from the LEA to SEA;
  - the development of secure decision support cubes deployed to SEA and LEA staff to analyze and disseminate accountability data; and
  - the development public decision support cubes to analyze and disseminate accountability data through the department's Connecticut Education Data and Research (CEDAR) website.

- *Curriculum Frameworks, Formative Assessment and State Assessment Released Item Database* – The department will deploy a persistent data layer of published Curriculum Frameworks, formative test items and released items from CMT and CAPT. The database will provide the following functionality:

  - augment the current Curriculum Framework website (www.CtCurriculum.org) by applying an indexing convention for each level (strand, content standard, etc.) of the existing frameworks;
  - the conversion of the existing frameworks into the database architecture;

1. Analysis of the business needs (multiple reporting and decision support needs) of key stakeholders, including the State, districts, school boards, schools, teachers, parents, students, the public, and other constituents.
   Analysis completed and further analysis is in process
2. Cataloging current and planned local data collection methods and data structures.
   Planned
3. Designing statewide longitudinal data systems architecture.

a. Including in data model the business needs of key stakeholders, who participate as data providers and users, and whose needs should determine the data types and items to be maintained in the system, years of data maintained, and data quality achieved (all of which define the breadth and depth of subsequent possible analyses)
   Planned
b. Developing effective data quality assurance system, that contains:

i. Data dictionary, with well-defined content and common definitions for data elements, to assure the same definitions, codes, and periodicity across all schools in the State at data entry points
ii. Business rules for data format, acceptable values, missing data options, and logical comparisons to prior data
iii. Automated data edit processes to verify data quality and to ensure that rules are met before allowing data into the State's data system
iv. Systems and procedures to assure correct utilization of data by the users and providers
   Planned

c. Developing an effective, statewide data model that defines and describes the logical and physical relationships between data items and systems, and system structure that allows efficient data maintenance and retrieval (containing relevant and linked current and historical data)
   Planned
d. Assuring secure access to data and formal reports to protect the confidentiality of individuals, in compliance with FERPA and the statistical reliability of results
   In process
e. Structured to enable efficient data extraction for time-based analyses
   Planned
f. Allowing modifications and enhancements to the system's data and architecture, including system expansion over time
   In Process

4. Creating, assigning, and tracking a unique, permanent student identifier assigned at state level.

a. Allowing the matching of individual student records across databases and years for every student enrolled in preK-12 state education system (using an automatic system creation of IDs or an individual creation through direct online interaction with ID system)
   In Process
b. Allowing for program evaluation (including potential capacity to track students past the 12th grade)
   Planned

- the loading of the existing frameworks into the database;
- the development of a secure, web-based interface, deployed at the SEA and LEA, to maintain the framework database;
- the development of a secure web-based interface, deployed at the SEA and LEA, to jury new generations of frameworks;
- facilitate the linkage of a Curriculum Framework data mart to a formative assessment and released assessment item bank;
- provide for the correlation of specific curricula in the framework application to formative and released assessment items and lesson plans/tasks;
- provide SIF enabled and traditional export functionality of the content provided in the framework application; and
- provide enhanced query and analysis cubes for searching and reporting on the content provided in the framework application.

4) Participation in a collaborative with the University of Connecticut Health Center, to develop a longitudinal research data warehouse, federating de-identified data from the Connecticut Departments of: Education; Children and Families; Public Health; and Mental Retardation

Connecticut has invested vast resources over the past few decades collecting and maintaining information relevant to the health and well-being of its citizens. This information, however, currently resides in more than a dozen separate state agencies, each having independent missions, governance, and technological infrastructure. For example, health surveillance data (i.e., immunizations, lead screening), healthcare utilization data, documentation of child custody and support services, and data on developmental outcomes and academic achievement reside in the Departments of Public Health, Social Services, Children and Families, and Education, respectively.

Connecticut intends to address this problem through a collaboration involving the University of Connecticut (UCONN), and the State's executive branch agencies. Government partners in Stage I of this initiative include the Departments of Public Health, Education, Children and Families, and Mental Retardation. Stage I has been funded by the University of Connecticut and the requested grant amount allocated by the Statewide Longitudinal Data System Grant will be to support the Department of Education's participation in this effort. The typical analysis and development cost of the specific deliverables will be leveraged by using resources at UCONN, and will include the identification of requisite data, data formats and the development of data sharing protocols, agents and interfaces.

Stage II is expected to be funded by UCONN and will expand this agenda to incorporate other child-focused agencies as well data relevant to the health and well-being of adults in the state. The University's efforts in this initiative will be directed by the Center for Public Health and Health Policy and will involve the active collaboration of faculty in UCONN's Schools of Medicine and Dental Medicine, the College of Liberal Arts and Sciences, the College of Agricultural Sciences & Natural

Resources, and the School of Business, among others. Akaza Research, a medical informatics consulting firm in Cambridge, MA, will provide technological expertise to this initiative.

Connecticut proposes to create an infrastructure and environment that allows shared access to health information across state agency databases for researchers, policy makers, and government officials. Traditionally, data integration and repurposing of databases for health-related research has been costly, as well as politically and technically difficult. However, the potential value to researchers, policy makers, and agency personnel is tremendous. The key benefits would include:

- the ability to comprehensively assess target populations and their interactions with various state agencies over extended periods of time;
- advancement of evidence-based practices through a more comprehensive evaluation of the link between programs and health outcomes over time;
- enhanced ability for program and agency self-evaluation through analysis of the effectiveness of current practices;
- potential for knowledge transfer and the establishment of best practices for data collection and data management;
- a vehicle for state agencies to articulate their needs and agenda to the legislative and executive branches of government;
- the collaborative development of data standards resulting in greater consistency in the structure and content of databases across state agencies.

The Approach to Integration: ***The Connecticut Health Information Network (CHIN)***

Akaza Research, UCONN's informatics partner in this project, has recently been awarded funding from the National Institutes of Health (NIH) to develop a framework that addresses problems that are pervasive in collaborative data sharing initiatives. This framework meets the need for an inter-related network of repositories and data sources that can securely share data and resources, thus aiding the conduct of multidisciplinary research. Additionally, the framework is designed to be decentralized, eliminating the need for costly and often politically difficult construction of a centralized data warehouse.

The technology is a lightweight, easily adoptable framework. The benefits of such a framework closely parallel the *Final NIH Statement On Sharing Research Data*, which suggests data sharing of this type as "essential for expedited translation of research results into knowledge, products, and procedures to improve human health." Currently, public health agencies in Connecticut generate a large volume of heterogeneous data, however; there is a lack of systematization or throughput to allow for high quality research and evaluation. The platform facilitates systematic organization and web-based access by allowing integration of diverse types of data across multiple data sources. It can enforce explicit privacy and regulatory requirements and tightly bind data to these requirements. In making such concerns a

central focus, it addresses serious regulatory issues in a transparent manner to alleviate privacy or security concerns inhibiting fruitful data sharing.

A set of shared data Registries brokers communications between participating research networks. These Registries are community-maintained, low-overhead systems designed to facilitate the sharing of data and services between disparate systems. Three principle Registries – Cases, Policies, and Studies – provide the set of vital services to facilitate:

(1) shared authentication and rights management;
(2) coupling of protocols, Institutional Review Board (IRB) restrictions, agency requirements, and informed consent with data;
(3) unique identification of study participants across projects, institutions, and networks; and
(4) correlation and transformations to datasets via widely adopted standards

Together these Registries form the backbone of the distributed data exchange model.

While the potential benefits of such integration are great, it is important to recognize the challenges to implementing the Connecticut Health Information Network. A recent review of Connecticut's child related databases identified a number of these challenges, including security and privacy, unique identification of individuals, accuracy and reliability of data, and the persistence of legacy computer systems. Akaza's technology framework is specifically designed to address these problems, as outlined below:

- ***Security and Privacy*** – Access to personally identifiable information (PHI) or other sensitive data must be carefully controlled and managed. Use of such information must adhere to a clear set of protocols consistent with agency guidelines, as well as HIPAA and FERPA privacy and security guidelines. Technological systems that limit access to sensitive information or that encrypt and de-identify such data will enable the collaborative to address this challenge. In addition, Institutional Review Boards and Data Safety Monitoring Boards must be in place to supervise and enforce such standards.
- ***Unique identification of individuals*** – Cases (i.e., individuals or families) may not have consistent, unique identifiers across the myriad of database systems across agencies, or occasionally even within agencies. Linking and matching these records is challenging, but disparities can be reconciled using systematic approaches and automated tools.
- ***Accuracy and reliability of data*** – Data and variable names are not uniformly coded, may not be recorded to the level of specificity desired by researchers, and may be ambiguous as to the semantics of what the data actually represent. A standards-based approach with intelligent mapping tools can assist in overcoming these obstacles. Also, data quality may be less than ideal due to transcription errors or lack of proper archiving. Annotation of such errors and improvements in data collection systems can help mitigate such issues.

- ***Legacy systems*** – Agency databases and computer systems are mainly designed for administration, case management, reporting, and accountability, not research. Additionally, these systems may be based on antiquated technologies that have not been updated for years or decades. Yet they contain a massive amount of information valuable for research, which must be collated from various data sources in a secure and usable manner.

Potential Research Projects

The successful integration of datasets residing in state agencies will create the opportunity for a host of quality research projects. To enhance our research collaboration with these agencies, UCONN has assembled a nationally recognized team of public health researchers who are committed to participating in this initiative and whose diverse interests and expertise present opportunities for research on a number of pressing health issues, including obesity and nutrition; asthma and the environment; mental health, addiction, and suicidal behavior; infant morbidity, mortality, and developmental delay; access to and utilization of healthcare services; and childhood caries. For example, several promising research projects have been tentatively identified:

- A comprehensive prospective analysis of developmental outcomes among low birth weight and very low birth weight children. This would include the correlation of these children to student achievement or other education indicators;
- An analysis of risk factors for suicidal behavior among children in protective services in Connecticut. This analysis will identify points of intervention and foster recommendations for risk management policies;
- An analysis of the effects of in-migration and residential mobility on access to and continuity in healthcare services in Connecticut; and
- An analysis of the patterning and distribution of childhood asthma in the state, and an evaluation of school-based surveillance systems to monitor and track asthma cases.

Funding Overview

UCONN has recently entered into a contract with Akaza Research to conduct background research and provide recommendations concerning the technical and operational prerequisites for creating the CHIN. This contract brings the total UCONN commitment to this initiative to approximately $200,000 over the past 18 months. UCONN intends to build on this investment with funding from a variety of sources:

- **Federal government** -- We are currently targeting several separate federal funding streams:
  - UCONN submitted an R21 application to the National Library of Medicine (NIH) in early 2005. If successful this grant will provide 2 years of funding

for the development of the CHIN and will provide a springboard for additional grants to a number of federal agencies.

- The Centers for Disease Control's *Assessment Initiative* has provided substantial support to data sharing and data integration projects in 14 states over the past 10 years. The next round of funding under this initiative is scheduled to be available in late 2005/early 2006. This grant would provide 5 years of funding for the further development and maintenance of the CHIN.

- **State government** -- In the past decade both the legislative and executive branches of government have expressed substantial interest in the integration of Connecticut's health and human service data. The UCONN administration has submitted an appropriation request in the current legislative session that includes support for the CHIN infrastructure.

- **Akaza Research** -- Akaza recently received SBIR (Phase I) funding from NIH for the development of technologies for data sharing and data integration and will be eligible to apply for Phase II funding in mid-2005.

5) Collaboration with Arizona and Maine to develop SIF Zones and SIF agents to pilot horizontal and vertical reporting models

In order to leverage the costs associated with development, Connecticut is planning a collaborative effort with the Arizona and Maine Departments of Education to develop SIF vertical and horizontal reporting models. The three states are using a common architecture, .NET and SQL, thus a relationship would commence that would facilitate the sharing of analysis and code among our states, not only during the development process, but more importantly long after the grant funding has expired.

The deliverables from the development collaborative will include:

- the development of a SIF Zone Integration Server to more efficiently manage the process of collecting and validating the data submitted by the LEA;
- the development of SIF agents to federate vertical data transmission from two pilot LEAs to the SEA;
- the development of SIF agents to pilot a state-to-state horizontal reporting model;
- the development of SIF agents to pilot a state-to-USDE vertical reporting model capable of meeting the reporting requirements of the Education Data Exchange Network;
- The definition of policies and procedures to jury the functionality of SIF.

6) Provide training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning

The most undervalued component of any systems deployment is the training of users to appropriately utilize the new or enhanced functionality. Many data warehouse projects fail to correlate data prior to the loading of persistent data stores, thus users are able to draw misguided conclusions on data that are not comparable.

The enhancements realized as part of the Statewide Longitudinal Data System grant will now allow Connecticut to present its content within the framework of state-of-the-art architecture; however, this endeavor will only be successful if the intended host of users can securely access and appropriately disseminate the data presented.

Thus, training will be offered to enterprise users on the following:

- how to use the data dictionary for consistent definition of the elements related to specific roles within the enterprise;
- how to best utilize and query decision support cubes;
- how to validate and interpret their findings with SEA researchers; and
- how to present their findings to their constituents.

Training will additionally be offered to enterprise staff with specific password provisioning roles in the use of identity management software.

3. Project Personnel

Management

Barbara Beaudin
Dr. Beaudin manages the Bureau of Research, Evaluation and Student Assessment and will oversee specific goals and objectives set forth by the Development Team as they relate to assessment.

Robert Lucco
Dr. Lucco manages all mandated data collection activities, data analysis and accountability reporting activities. In addition, Dr. Lucco facilitates interoffice collaboration regarding research and evaluation projects. Dr. Lucco will oversee the all activities and meet daily with the Project Manager of the Development Team.

Development Team

Mark Vocca
Mr. Vocca is the lead systems architect for the department will act as the Project Manager overseeing the daily activities outlined in this grant. Mr. Vocca has been with the department since 1992 and brings over twenty years of database design and system analysis experience to the project. Mr. Vocca is the department's primary contact to the Chief State School Officer (CCSSO) Decision Support Architecture Consortium (DSAC). In that capacity he has managed DSAC consultants in two phases of work: the development of functional and business specifications for the student ID database (PSIS); and the specification of the Enterprise Security Framework and Lightweight Directory Access Protocol (LDAP) documents. Mr. Vocca will allocate 90% of his time to the project.

Sarah Ellsworth
Ms. Ellsworth analyzes student assessment data for determining Adequate Yearly Progress (AYP) and School Improvement Status for Connecticut's schools under the No Child Left Behind Act of 2001 (NCLB). She produces the NCLB state, district, and school accountability data reports and is the primary contact person for assisting school district personnel in the interpretation of the reports and the data therein, and any associated implementation of NCLB requirements. Additionally, Ms. Ellsworth contributes to policy decisions regarding NCLB implementation. She will be the lead analyst for assessment and NCLB database and dissemination projects. Ms. Ellsworth will allocate 20% of her time to the project.

Kevin Graham
Mr. Graham is the lead Analyst/Developer for web based data collections for the department. His body of work includes the development of the Public School Information System (PSIS), and the Connecticut LEA Staff database. His development platforms include Microsoft .Net, SQL, ASP, Crystal Reports and SQL Reporting Services. Mr. Graham's development expertise will be utilized to assist the Project Manager with drafting specifications, selecting vendors and overseeing development activities as outlined in this grant. Mr. Graham will allocate 75% of his time to the project.

Mathew Pickering
Mr. Pickering is an Analyst/Developer for the department's Accountability Reporting Unit. His skills as a web-application designer are used to develop decision-support tools and data dissemination programs for both internal use and public access. His development platforms include Microsoft .Net, SQL, ASP, Crystal Reports and SQL Reporting Services. Mr. Pickering's development expertise will be utilized to assist the Project Manager with drafting specifications, selecting vendors and overseeing development activities as outlined in this grant. Mr. Pickering will allocate 55% of his time to the project.

Diane Murphy
Ms. Murphy is a doctoral candidate at the University of Connecticut in Educational Measurement and Evaluation. She has worked for the CT Department of Education since 2001 serving as data analyst for the Bureau of Special Education through her position in the Office of Research and Evaluation. Ms. Murphy's primary research area is the design of hierarchical models for predicting a student's likelihood for identification as a student with disabilities. Current modeling strategies indicate the best predictors include a child's socioeconomic, medical and birth histories (exposure to lead paint, premature birth weight, etc.). Additionally, Ms. Murphy will be participating as a researcher in the CHIN Project, working with the Departments of Public Health and Social Services to examine the impact of early childhood risk factors on public school achievement and identification for special education services. Ms. Murphy will allocate 30% of her time to the project.

Keryn Walczewski
Ms. Walczewski will assist Kevin Graham with activities outlined in this grant. Her responsibilities will additionally be to facilitate LEA focus groups and document collaboration projects. Ms. Walczewski will allocate 20% of her time to the project.

Richard Cloud
Mr. Cloud is an Education Consultant with 18 years of experience in the department. He is currently the CCD and PBDMI/EDEN Coordinator to the Federal Department of Education. Mr. Cloud will assist the Project Manager with the SIF and Data Dictionary components of this project. Mr. Cloud will allocate 20% of his time to the project.

Collaboration Team

Robert Aseltine, Connecticut Health Information Network
Dr. Aseltine is an Associate Professor in the Department of Behavioral Sciences and Community Health at the UCONN Health Center, and is UCONN's project director. Dr. Aseltine is a medical sociologist with expertise in quantitative research methods and statistics; his primary area of substantive expertise is child and adolescent mental health and social development. Dr. Aseltine will provide scientific and technical leadership for the project; supervise UCONN staff committed to the project; lead efforts to obtain funding; coordinate interaction with participating state agencies; and supervise the work of Akaza Research, the informatics contractor.

Patrick Cooney, Connecticut Health Information Network
Mr. Cooney has recently joined the UCONN Center for Public Health and Health Policy as an Applications Developer. He will oversee integration of the network into the UCONN Health Center's IT infrastructure and will work with UCONN's Department of Information Technology, Connecticut's State Department of Information Technology, and the UCONN Health Center's Office of Corporate Compliance to ensure compliance with all state, federal, and institutional guidelines for computing systems handling PHI. He will also work with participating agencies to coordinate deployment of the network prototype.

4. Resources

Facilities
The department has two main facilities in the state, both centrally located with ample office space to conduct meetings, training and vendor activity.

Equipment
The department has a technology infrastructure sufficient to meet the initial outcomes developed or enhanced by funding from this grant. The department has recently purchased additional servers to deploy its Active Directory project, and has purchased Microsoft Sharepoint licenses sufficient to deploy secure content to all department and LEA staff, the research community and all students and parents within the state.
The current network at the Connecticut SDE employs several servers on a Microsoft Windows Server 2000 based network. Exchange 2000 is used with NT level security to distribute access and privileges across the entire network. A total of 4 SQL Server 2000 databases currently store historical, transactional, and analysis data that are replicated to a

public server for content and dissemination as well as internal servers for archiving in preparation for a warehouse.

Within 90 days the burden of Exchange management will be migrated to the Connecticut Department of Information Technology. In addition, all users will be migrated to Exchange 2003. Internally, a large scale Storage Area Network (SAN) will be installed and integrated with new Active Directory security layer and Sharepoint Portal interfaces. The new network is being built to accommodate data warehouse – sized repositories interacting with current SQL Server 2000 based servers. SQL Server 2005 and SQL reporting services will be rolled-out in 2006 in anticipation of the creation of de-normalized analysis cubes for export in to decision support and analysis software platforms.

Staff

The department is adding several staff positions in the Information Technology Department. The new staff will be dedicated to the development of database applications and the deployment of portal web parts through it education portal.

Planned Work

The department is planning many initiatives that embrace not only the use of technology, but the architecture required to provide a viable foundation for decision support. The PSIS project has been deployed with training on the new design commencing in June, 2005. The Security Framework/LDAP documentation is being reviewed by Microsoft and is planned for a pilot/proof of concept deployment in September, 2005.

Collaborative Efforts

The Connecticut Health Information Network (CHIN)

The department is currently drafting a Memorandum of Understanding (MOU) with UCONN and the participating state agencies to outline its participation in the Connecticut Health Information network (CHIN) project. Once approved, the department will participate in Stage I activities that are funded by UCONN.

Stage I has been funded by the University of Connecticut and the requested grant amount allocated by the Statewide Longitudinal Data System Grant will be to support the Department of Education's participation in this effort by re-engineering its infrastructure and adopting national standards to its collected elements. The typical analysis and development cost of the specific deliverables will be leveraged by using resources at UCONN, and will include the identification of requisite data, data formats and the development of data sharing protocols, agents and interfaces.

The collaborative proposes to create an infrastructure and environment that allows shared access to health information across state agency databases for researchers, policy makers, and government officials. The key benefits of the collaboration effort would include:

- the ability to comprehensively assess target populations and their interactions with various state agencies over extended periods of time;

- advancement of evidence-based practices through a more comprehensive evaluation of the link between programs and health outcomes over time;
- enhanced ability for program and agency self-evaluation through analysis of the effectiveness of current practices; and
- the collaborative development of data standards resulting in greater consistency in the structure and content of databases across state agencies.

Potential Research Projects

The successful integration of datasets residing in state agencies will create the opportunity for a host of quality research projects. To enhance our research collaboration with these agencies, UCONN has assembled a nationally recognized team of public health researchers who are committed to participating in this initiative and whose diverse interests and expertise present opportunities for research on a number of pressing health issues, including obesity and nutrition; asthma and the environment; mental health, addiction, and suicidal behavior; infant morbidity, mortality, and developmental delay; access to and utilization of healthcare services; and childhood caries. For example, several promising research projects have been tentatively identified:

- A comprehensive prospective analysis of developmental outcomes among low birth weight and very low birth weight children. This would include the correlation of these children to student achievement or other education indicators; and
- An analysis of the patterning and distribution of childhood asthma in the state, and an evaluation of school-based surveillance systems to monitor and track asthma cases.

Connecticut and Maine State Collaboration

The Connecticut Department of Education intends to collaborate with the state educational agencies of Arizona and Maine to leverage funding from this grant program to maximize common outcomes.

Objectives

- Collaborate with other states having common infrastructure and architecture technologies (Arizona and Maine) to develop standards, practices, and guidelines, and relevant training materials and resources, regarding effective SEA and LEA data warehousing.
- Collaborate with other states having common infrastructure and architecture technologies (Arizona and Maine) to share and leverage expertise in systems analysis and code in the development and enhancement of each state's longitudinal data system.

Outcomes

- Develop standards and promising practices regarding SEA data warehousing, to include:
  - Polices and guidelines for appropriate usage of data

  - Security
  - Standard front-end views
  - Depth of Data Dictionary, to include standard definitions
  - Sharing of data across states
- Develop standards and promising practices regarding LEA data warehousing
- Develop training and support materials and resources for SEA's and LEA's regarding the standards and promising practices of effective data warehousing.
- Share and leverage expertise regarding analysis and code in the development and enhancement of each state's longitudinal data system, to include:
  - Development of data dictionaries
  - SIF enabling (Vertical and Horizontal)
  - SQL server and .NET architecture components

5. Management Plan

Each component addressed in the grant will be defined in a detailed specification, outlining the business and functional requirements for each deliverable. The deliverables will be clearly articulated in both a technical and non-technical format to assure that all participants are well aware of the expectations related to each project. Specific benchmarks relative to the deliverables will be outlined in any RFP issued.

The Project Manager will report to the Technology Design and Oversight Committee weekly with project status reports, specifically addressing the benchmarks cited in the contract. Additionally, the committee is required to report bi-weekly to a management committee chaired by the Associate Commissioner.

The Project Manager will work closely with the department's Office of Grants Management forwarding bi-weekly status reports to ensure that monies disbursed are in accordance with specific deliverables.

The State of Connecticut's Department of Information Technology (DoIT) will act as an additional oversight entity. Each RFP will be subject to the protocols of state contract language and award procedures and this process will be juried by DoIT.

The business requirements of each component will identify stakeholders and collaborating entities for each deliverable. The host of stakeholders would include SEA data managers, LEA staff, parents, UCONN, and the states of Arizona, and Maine. Sub-committees of the stakeholders will be formed prior to the Joint Application Design phase of each deliverable. In addition to their role of vetting the application design, they will also serve as pilot entities during the development process and meet with Project Manager as required.

The Project Manager will additionally report to the U.S. Department of Education in and complete the ED 524B Project Status Chart, outlining project objectives and performance measures as they relate to each deliverable.

Barbara Q. Beaudin

Education

Harvard University, Graduate School of Education, Ed. D., 1988
Administration, Planning, and Social Policy Analysis
Dissertation: Former Teachers: A Study of the Characteristics of Teachers Who Return to the Classroom
University of Hartford, Sixth Year Certificate, 1979, Public School Administration
Central Connecticut State University, M.S., 1972, Mathematics
Central Connecticut State University, B.S., 1969, Mathematics

Certification

Intermediate Administrator Certificate (092)
Mathematics 7-12 (029)

Professional Experience

Connecticut State Department of Education
Bureau Chief, Bureau of Research, Evaluation and Student Assessment (September 2004 – present)
Bureau Chief, Bureau of Student Assessment (November, 2003 – September 2004)
Education Consultant, Bureau of Evaluation and Educator Standards (December 2000 – November 2003)

- Responsibilities: Conducted program evaluations of the Early Reading Success Grant Programs and the interdistrict magnet schools;
- Provided technical assistance to the Charter School, Magnet School, Priority School Units and the Bureau of School Improvement regarding NCLB, accountability and student assessment, resource regarding
- Conducted studies of teacher and administrator supply and demand and school leadership;
- Conducted other research as requested by the commissioner, associate commissioner, and bureau chief.

Contract Consultant, Bureau of Research and Evaluation (1986 – 2000)

- Conducted 15 surveys to monitor the state's public school work force and the quality of schools;
- Prepared 17 Research Bulletins;
- Prepared 8 reports and papers.

University of Hartford (1988 – 2000)

- Associate/Assistant Professor of Mathematics (Discrete Mathematics, Calculus and Statistics);
- Also served as the Mathematics and Science Department Chair and Associate Dean in Hillyer College and Assistant Dean of the College and Arts and Sciences, and on over a dozen University Committee;
- Produced 16 professional papers and publications.

Farmington Public School (1969 – 1985)
Mathematic teacher and high school administrator.

Resume

ROBERT J. LUCCO

(860) 713-6888 Office
robert.lucco@po.state.ct.us

Education:

	University of Virginia, Ed.D. Research Methodology	1974
	University of Wisconsin, M.S. Urban Education	1971
	American University, B.A. Sociology	1969

1972 to 1974 — Awarded Doctor of Education degree, University of Virginia, August 1974. Major areas of concentration included research design, statistical analysis, and program evaluation. Minor fields of study elementary education and social foundations of education.

1969 to 1971 — Awarded Master of Science degree, University of Wisconsin, June 1971. Major field of study urban education/elementary curriculum and instruction. Minor area educational psychology. Course work included social issues and education, education and the disadvantaged, and urban teaching.

Work Experience:

February 2004 to December 2004 — Acting Bureau Chief. Office of Research, Evaluation and Accountability

December 2004 to Present — Director. Office of Research and Evaluation, Bureau of Research, Evaluation and Student Assessment

Responsibilities include: managing all annually mandated data collection activities. Managing all office data analysis and accountability reporting activities. Facilitating interoffice collaboration regarding research and evaluation projects. Evaluating all office professional and support staff.

1996 to present — Adjunct Professor. Saint Joseph College, West Hartford, Connecticut.

Responsibilities include: teaching Education 515: Educational Research Methods; and Education 524 Instruction and Curriculum for the Graduate School.

1977 to 2003

Education Consultant/Unit Coordinator. Data Collection and Reporting Unit, Division of Evaluation and Research, Connecticut State Department of Education.

Responsibilities included: managing the Strategic School Profiles Project, which introduced school-based reporting to the state in October 1992; coordinating the operations of the Data Collection and Reporting Unit; providing technical assistance in the development and production of school district curriculum surveys and parent surveys; and providing ad hoc analyses of statistical data based upon the needs of Department staff, members of the press, and the public. In May 2000, a team of unit members under my direction launched a data dissemination website for the Division of Evaluation and Research. Go to www.state.ct.us/sde and select *school/district data.*

Professional Affiliations:

American Educational Research Association

New England Educational Research Organization

Northeastern Educational Research Association

MARK D. VOCCA
(b)(6)

Employment

1993 to present **Education Consultant**
State of Connecticut, Department of Education, Hartford, CT

- Conceptualize, architect and write specifications for data collection systems.
- Act as liaison between vendor and end-user, overseeing pilot, beta, and delivery phases of database projects.
- Design front-end and navigational metaphor for databases and web pages.
- Program MS Access databases to track students and programs.
- Oversee Special Education and Adult Education data collection, integrating mainframe and PC tables into MS Access databases.
- Create MS Access reports for Adult Education and Special Education Strategic School Profiles (distributed to the General Assembly, the State Board of Education, local school districts and the general public).
- Act as bureau advisor for Internet and Intranet programming efforts.
- Facilitate workshops for school administrators, teachers, and counselors to provide training in the use of state mandated databases, Microsoft Products and Web Authoring Tools.
- Draft system specifications for Requests for Proposal.

1995 to present **Internet Content Management**

- Work with clients to plan and deploy data collection and marketing initiatives through the use of the Internet.
- Design portal and content management sites for the University of Connecticut.
- Design web sites using HTML, Java Scripting, Macromedia Dreamweaver, Fireworks, and Flash, and Lotus Notes.

1991 to 1993 **Information Systems Manager**
Great Pond Publishing, Rocky Hill CT

- Wrote database application to track $2 million in inventory at 27 locations throughout the U.S.
- Purchased, installed and networked 50 PCs and Macintosh computers.
- Directed and designed of a variety of multimedia products for sales staff.
- Evaluated & recommended PC Desktop Publishing platform for the company.

1986 to 1991 **Wholesale Audit Manager (Bank Officer)**
Bank of New England (Now Fleet Bank), East Hartford, CT

- Managed Wholesale Lending Audit Department supervising 3 field managers and 16 auditors.
- Responsible for the audit and reporting of a $400 million asset based loan portfolio overseeing 82 relationships throughout the northeast.
- Developed and maintained databases using Dataease and DB2 which generated inventory exposure and leasing depreciation reports.

Professional Profile

- Offering strong creative abilities, technological skills with a thorough knowledge of database management, multimedia, Internet and PC computer operations.
- Self-motivated, goal-oriented, highly organized team player with the ability to work under pressure, meet tight deadlines and handle multiple projects simultaneously.
- Always willing to put forth the effort required to achieve superior results.
- Possessing excellent interpersonal and written communication skills, with the ability to relate well at all levels.

Military Experience

- 1981-1985 United States Air Force
- Inventory Systems/PCAM Specialist
- Honorable Discharge

Education

- San Antonio College, San Antonio, Texas
- Central Connecticut State University, New Britain, Connecticut
- Lake Erie College, Painseville, Ohio

OS and Application Experience

Intermediate or expert knowledge of the following:

Database Applications
Microsoft Access and Visual Basic
Micrsoft .Net
Lotus Notes/Domino
FileMaker Pro Relational
Lotus Approach
Visual Fox Pro
ACI 4th Dimension

Business Software
Microsoft Excel, Word, Powerpoint
Microsoft Outlook
Corda Pop Chart
SPSS
Lotus 123

Web Development Tools
HTML Programming (tables, frames, java script)
Macromedia Studio MX
Macromedia Flash
Lotus Notes
FTP Software

Graphics & Multimedia Tools
Adobe Photoshop 5.0
Quark Xpress
PageMaker
Caere Twain and OCR Software

Sarah S. Ellsworth
(b)(6)
sarah.ellsworth@po.ct.state.us

Education:

University of Connecticut, Storrs, CT.
Coursework completed towards Ph.D. in Educational Psychology
St. Joseph College, West Hartford, CT.
M.A., Education, May 2000
Initial Educator Certificate, Grades 7-12 Social Studies
University of Connecticut, Storrs, CT.
B.A., Anthropology, May 1994

Employment History:

Connecticut State Department of Education
Bureau of Research, Evaluation and Student Assessment

Education Consultant, July 2005 to present
Associate Education Consultant, July 2003 to July 2005
Education Service Specialist, July 2000 to July 2003
Education Support Technician, July 1999 to July 2000
Connecticut Careers Trainee, July 1998 to July 1999

- *Implementation of the No Child Left Behind Act of 2001* - Conducts analyses relative to determining Adequate Yearly Progress (AYP) for Connecticut's schools under No Child Left Behind (NCLB). Produces the No Child Left Behind (NCLB) state, district, and school accountability data reports. Responsible for the design of these reports, and the programming required to produce them. Primary contact person for assisting school district personnel in the interpretation of the reports and any associated implementation of NCLB requirements. Contributes to policy decisions regarding NCLB implementation. Represents SDE by conducting presentations about NCLB to school district personnel when needed

- Manages three major databases: Fall Hiring Survey, Dominant Language, and Mathematics and Science Enrollments. Responsible for the programming, technical assistance to LEAs. Analyzes and interprets data and produces final reports.

- Authors the Fall Hiring Report, an annual document regarding teacher shortage areas that is presented to the State Board of Education.

- Serves as the contact person for the Federal Teacher Shortage Area program sponsored by the U.S. Department of Education. Submits a yearly proposal of teacher shortage areas in Connecticut and communicates the federal approval to LEAs and answers their questions about the program.

Graduate Intern, October 1996 to August 1997
Worked under the direction of two Education Consultants. Created and maintained databases of non-public and public school enrollment data. Obtained and organized district data necessary for generating yearly CMT and CAPT reports. Collected all district ED-205 Title I Evaluation forms and reviewed them for accuracy. Produced the Title I yearly report submitted to the federal government.

Conard High School, West Hartford, CT
Teacher, January 1998 to June 1998
Taught 10th grade US History and 9th grade World History. Responsible for all lesson planning and test creation. Faculty advisor for the school's first drill team.

Manchester High School, Manchester, CT
Substitute Teacher, November 1997 to January 1998
Student Teacher, August 1997 to November 1997

Co-Opportunity Personnel, Hartford, CT
Personnel Consultant, November 1995 to June 1996

Computer Skills:
Microsoft Word, Excel, Access, Powerpoint, SPSS, MapInfo, Visual Basic

Kevin Graham

(b)(6)

A dedicated software developer with over 15 years of experience in the development of financial and data collection applications. Experience in every aspect of software development with a focus on object oriented design. Works well independently and on teams. Enjoys the challenge of working with the business to gather requirements, design and develop new applications, migrate existing applications to new architecture and integrate existing applications. Maintains skill set by attending annual developer conferences and reading industry magazines.

Languages:	VB.Net, ASP.Net, Visual Basic 4-6, HTML, DHTML, ASP, VBScript, SQL
Technologies:	Microsoft .Net Framework, XML, Web Services, MTS/Com + Services, COM/DCOM, ADO, Crystal Reports, ODBC
Tools:	Visual Studio.Net, Visual Studio, Visual Interdev, Visual Sour Safe, Crystal Reports Write, SQL Reports, Enterprise Manager
Servers:	IIS, MTS, MS SQL Server, Access

Experience

1999-Present — **CT Department of Education**
Technical Analyst/Developer

- Analyzed current applications and recommended the best migration to new technology.
- Installed, administered and secured 3 Windows 2000 servers with Internet Information Server.
- Installed and administered 3 SQL Server 2000 databases.
- Worked independently, and then trained new staff members on technologies.
- Created web applications for school districts to log onto and enter data for State and Federal reporting.

1998-1999 — **KISSystems**
Software Developer

- PC Based 3-tier client/server student financial aid management system written in Visual Basic using object oriented design.
- Assisted in design, development, testing and deployment of software.

1989-1998 — **CT Department of Administrative Services**
Systems Developer

- Lead developer on State of Connecticut's phone billing system written in VAX basic.
- Worked with telecom venders in developing billing formats.
- Assisted in the development of CASE management tools.

Education

1987-1989 **Hartford State Technical College**
Graduated with 3.8 GPA
Earned A.S. in Information Management

Mathew W. Pickering
(b)(6)

Objective

Acquire a position with the Department of Education where I can challenge my own exceed those of my peers and leaders.

Software Skills

ASP, HTML, CSS, XML, XSL, XSLT, SQL Server 7.0/2000, Visual Studio 6.0, VB 6.0, VBScript, SPSS, Crystal Reports 8.8/8.5, Java, C, Query Analyzer, Enterprise Manager, ADO, MTS, Office 9x, 2000, 2002, MS Project 2000, 2002
Development Platforms: Windows 9x, NT, 2000, XP, Linux

Work History:

Institute of Living- Hartford CT March 2003- Present
Olin Neuropsychiatry Research Center
Database Programmer/System Designer

- Design and Implement a ground-up instance of SQL Server 2000 Database environment
- Educate a staff of 20 regarding application use and workflow optimization
- Configure and maintain all web and database servers
- Responsible for manipulation of Terabytes of sensitive data
- Write and execute all data backup and recovery policies
- Use Visual Basic, MatLab, and scripting technologies to interface disparate systems (Sun, Unix, Mac, PC)
- Create policies which prove to be first-time implementations in the research industry

Elevation Solutions, LLC-Farmington CT May 2002-Present
Founding Member/Systems Developer/Sales

- Co-founded web/firmware development firm
- Provide custom web applications for organizations looking to streamline operations
- Migrate legacy data systems to new technologies (SQL, Access, Excel, SPSS)
- Primary role of systems analysis
- Use ASP and Palm OS to deliver web-applications via wireless devices

State of Connecticut- Hartford CT
Department of Education-Office of Information Systems November 2001-February 2003
Programmer

- Responsible for entire application life cycle
- Web-Based Application designer in a three-tier development environment
- Provided Client Support to all school districts
- Assume responsibility for analysis, design, and implementation on all data-driven web based applications
- Use VB 6.0 to write Business Objects, adhering to Microsoft DNA protocol
- Applied given business rule to create Active Server Pages for web-based applications
- Provided dynamic reports by utilizing several technologies, for the purpose of data analysis and archiving by providing remote connections to SQL databases as well as creating custom web-based reports in Crystal Reports 8.0 and 8.5

State of Connecticut- Hartford CT May 2001-November 2001
Department of Education-Office of Information Systems
Information Systems Intern

- Performed new fiscal year updates to existing web applications
- Designed new security logon screens for web applications
- Used Data Transformation Services in SQL Server 7.0 to back up databases
- Prepared online applications for new data collection periods
- Installed and maintained new PC workstations
- Ran backup utilities and assisted with server maintenance

EDUCATION
Central Connecticut State University, New Britain, CT
2001 B.S. Computer Science
Computer Education Services, Bloomfield, CT
2002-XML, XSL, and Schemas
New Horizons Learning Center, Windsor, CT
2002-Programming and Administering SQL Server 2000
1999-Advanced HTML

References furnished upon request

Diane Michele Murphy

Connecticut Department of Education
Education Consultant
165 Capitol Avenue
Hartford, CT 06145

Education

Doctoral Student in Educational Psychology *(Expected Graduation Date: May, 2002)*
Cognition and Instruction: Measurement & Evaluation Emphasis
University of Connecticut – Storrs, CT

Educational Specialist Degree in Administration; 1997
University of Missouri – Kansas City, MO

Master of Arts Degree in Secondary Science Education; 1993
Truman State University – Kirksville, MO

Bachelor of Science Degree in Biology; 1992
Truman State University – Kirksville, MO

Educational Experience

Adjunct Professor, University of Connecticut, Fall 2000
EPSY 253: Assessment of Learning II
Course Topics: Test Construction, Item Analysis, Performance Assessments and Rubrics.

Graduate Assistant, University of Connecticut, Fall 1999 – present
Bureau of Educational Research and Service
Statistical analyst/measurement specialist. Consultant for faculty, staff and student research.
New England Center for Policy and Leadership Studies
Research assistant on Connecticut Department of Children and Families, At-risk Educational Services Project. Principal researcher for education policy briefs.
Public School Laptop Initiative Coordinator
Test constructor/administrator, professional development coordinator, administration liaison, graduate student supervisor and database coordinator.

Lead Teacher, Andrew Drumm High School, 1995-1999
Served as vice–principal of Alternative High School. Handled student discipline, enrollment hearings, parental communication and teacher supervision.

Classroom Teacher, Andrew Drumm High School, 1993-1999
Math and science instructor with at-risk student population.

Classroom Teacher, Liberty Senior High School, 1992-1993
Advanced placement Biology, Microbiology and Anatomy/Physiology instructor.

Evaluation Experience

HIV Prevention Evaluation Bank; December 2000-Current
Technical assistant to Community-Based Health Centers, Organizations, and Local Health Departments in the areas of research design and data analysis/interpretation for evaluations of HIV prevention education programs and HIV counseling and testing programs in Connecticut.

Worcester Polytechnic Institute; Fall 2000-Spring 2001
Co-evaluator on NSF-IWR funded project assessing Physics and Calculus Bridge programs. Duties include planning, designing and implementing a mixed method model of evaluation.

Hartford Laptop Initiative; Spring 2000-Current
Principal investigator evaluating the impact of Laptop Initiative on student learning. Grant funded by United Technologies Corporation.

Educational Testing Services; 2000
Participant Observer/Data Collector, employed for the administration of the Connecticut Administrators Test, a pilot project. Duties included following strict ETS protocol, keeping field notes, collecting and securing materials, assisting test takers, and organizing test administration team.

Professional Presentations

Murphy, D.M., King, F.B., & Brown, S.W. (April, 2001).
Impact of Technology Support Systems on Teacher Attitudes.
To be presented at the American Educational Research Association, 2001 Annual Meeting, Seattle, Washington.

Murphy, D.M., King, F.B., & Brown, S.W. (October, 2000).
High School Laptop Initiative: Student Attitudes and Self-efficacy Toward Technology.
Presented at the Northeastern Educational Research Association, 31st annual conference, Ellenville, New York.

Ataya, R. L., Murphy, D. M., Kulikowich, J. M., & Brown, S. W. (June, 2000).
Rating Problem Identification in Elementary School Students During a Written Task.
Presented at the American Psychological Society Conference, Miami, FL.

Teaching & Learning Presentations

Alternative Education Conference; November 1998
Presented the school-to-career at-risk program design of the 1998-99 School Excellence Grant to the Missouri Association of Alternative Schools.

Missouri Standards-Based Instruction & Assessment Cadre; 1996-98
Presented information on the background and implementation of the Missouri "Show-Me" standards, curriculum framework documents, and the new performance-based assessment system in a variety of settings that included school board members, school administrators and teachers.

Technology, Industry & Education Conference; February 1997
Presented the Globe Program as an example of the cooperation between business, technology and science education leaders to improve hands-on science instruction across the nation through use of the Internet.

National Science Teachers Association; October 1995
Presented an outdoor science curriculum as a cooperative association between public schools and the Missouri Conservation Department.

Missouri Training Institute Governors Conference; October 1994
Presented the at-risk program design of Andrew Drumm High School with an emphasis on the school-to-work and community-based education focus.

Professional Associations

American Evaluation Association; AEA
American Educational Research Association; AERA
Northeast Educational Research Association; NERA
National Education Association; NEA

Keryn G. Walczewski

(b)(6)

A hard working software developer with an innovative approach to development. Eager to learn and willing to work alone or as part of a team. Enjoys challenging projects that utilize a number of skills. Dedicated to making finished products intuitive and user friendly. Builds and maintains skill sets by attending annual developer conferences, reading industry magazines, and attending training courses.

PROFESSIONAL EXPERIENCE

Connecticut State Department of Education, Hartford, CT January 2002- present
Office of Information Systems
Education Support Technician, Connecticut Career Trainee, Programmer, Systems Development Intern

- Member of the application development team that wrote projects such as the Public School Student Information System (PSIS), which will put Connecticut into compliance with H.R. 1, *No Child Left Behind Act of 2001*
- Modify existing web pages to meet W3C's Web Accessibility Initiatives (WAI)
- Create ASP pages as specified for online data collection for state mandated reports
- Provide training sessions for school districts and write in depth training materials
- Create reports that analyze multiple aspects of Connecticut's Public School System as well as information gathered through state-wide surveys

Central Connecticut State University, New Britain, CT September 1997 – December 2001
Office of the Vice President for Student Affairs
Staff Assistant

- Designed, created, and maintained the Student Affairs web site, which included an online data collection system
- Designed brochures for a variety of events
- Assisted with the coordination of major Student Affairs events such as Freshman Registration and Orientation

EDUCATION

Central Connecticut State University, New Britain, CT
Master of Business Administration, May 2006
International Business

Central Connecticut State University, New Britain, CT
Bachelor of Science degree, 2002
Management Information Systems major, Psychology minor

TECHNICAL SKILLS

- PC literate in Windows NT, Windows 95, 98, 2000 and XP environments
- Can program using HTML, Visual Basic, JavaScript, traditional ASP and ASP.NET
- Proficient use of Access, Excel, SQL Server, Crystal Reports, Microsoft Visual SourceSafe 6.0, Microsoft Visual InterDev 6.0, Word, PowerPoint, FrontPage, and Publisher
- Can operate in a Mac OS and have graphics experience using Quark, QuarkXPress and FreeHand

(b)(6)

AWARDS AND ACTIVITIES

College Academic Day Award recipient
President's Citation recipient
Foundation Scholarship recipient

CCSU Foundation Board of Directors *June 2001 – May 2002*
Student Representative

- *Represent the CCSU student body to the Foundation Board of Directors*
- Act as a liaison by communicating ideas and opinions between the CCSU student body and CCSU Foundation Board of Directors

New Britain High School Adult Education Program *January 2001 – March 2001*
Co-Instructor (Volunteer), "Introduction to Excel"

- *Assisted instructor with a hands-on approach to learning*
- Guided students step-by-step through lessons and assignments
- Assessed knowledge level of students and adapted teaching methods to meet their individual needs

Richard J. Cloud

Education

Florida Institute of Technology, B.S., 1979, Oceanography

Various data processing courses

Professional Experience

Connecticut State Department of Education
Education Consultant, Bureau of Research, Evaluation and Student Assessment (1987- present)

O Responsibilities: CCD and PBDMI/EDEN coordinator to the Federal Department of Education;
O Developed the computer program to produce the Strategic School Profiles (SSP);
O Maintain the electronic version of the SSP's on the web and the Connecticut Education Database;
O Maintain the electronic Education Directory;
O Participate in the PSIS, Web Development, and Attendance committees.

Dade County Public Schools
Senior Programmer Analyst, Office of Educationality Accountability (1984-1987)

O Responsibilities: Produced District & School Profiles;
O Produced Compensatory Education Analyses;
O Produces additional analyses as required by state and federal laws.

Components Addressed Through This Grant

1) Collaboration with Arizona and Maine to Develop a Data Dictionary to Serve as a Conclusive Meta-Library for Elements Collected on Behalf of the Department

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Research, Analysis, Documentation and Authoring of Data Dictionary	1	(b)(4)		
Development, Pilot, Content Loading and Deployment of Case Management Tools and Service Registries	1			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable
The Connecticut State Department of Education is planning a collaborative with the Departments of Education in Arizona and Maine to develop a Data Dictionary. The dictionary will be a conclusive meta-library for each element collected by the department and will provide consistent definitions for district users and School Information System (SIS) vendors.

This component is considered the highest priority in this grant application. The dictionary will be the sole reference source for data warehouse architecture and at minimum it will provide the following metadata on each element collected:

- element name;
- data type;
- security classification;
- related elements;
- code formats;
- Education Data Exchange Network (EDEN) crosswalks;
- Common Core of Data (CCD) crosswalks;
- SIF and NCES metadata crosswalks;
- ISO/IEC 11179 and Dublin Core metadata specifications;

- inter-element validation details;
- database table references;
- application domain definitions;
- data sources;
- historical and external references;
- quality control references;
- local, state and federal policy references;
- validity dates; and
- entity/user LDAP relationships.

The dictionary will document each element using an indexing convention and be housed in a case management application. The case management application will provide create, read, update and delete functionality to facilitate the maintenance of the dictionary. The case management application will also include the following registry services:

- *Data Sources & Services Registry* – This registry will provide a searchable directory of data sources, agency contacts, and services available within the enterprise. It will provide descriptive information about the data sources to end-users searching the registry and serve as the authoritative source for services (i.e. the data processing engine) looking for connection information to those data sources; and

- *Data Elements Registry* – The registry will house the published data definitions contributed by each data source. It will provide the definitions as a searchable catalog, as well as organize data definitions hierarchically for browsing. The Connecticut Education Data and Research (CEDAR) interface will use this data definitions catalog for building query statements. The registry will integrate the data definitions catalog with standardized vocabularies.

2) The Specification and Development of an Enterprise-wide Persistent Data Storage Facility

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Enterprise-wide Data Management Schema	1	(b)(4)		
Enterprise-wide Data Management Specification	1			
The Deployment of an On-going Operation and Maintenance Strategy	1			
The Pilot Deployment of an Enterprise-wide Persistent Data Storage Facility	1			
The Deployment of an Enterprise-wide Persistent Data Storage Facility	2			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

Using the data dictionary as a guiding document, the department will architect and build a persistent data layer to fulfill the requirements of a data warehouse. The components of this activity are as follows:

- *Enterprise-wide Data Management Schema* – The schema will:
  - be developed and documented in an industry standard case tool and rely on Joint Application Development (JAD) strategies to facilitate participation among the stakeholders in the enterprise;
  - be presented in both a traditional schema metaphor for each relational layer and a STAR or consolidated dimensional hierarchy for the persistent layers; and

- identify the requisite objects and elements and document their relation and inter-dependency to the data storage, domain object, presentation and persistent layers.

- *Enterprise-wide Data Management Specification* – The specification will:

  - define the business and functional requirements of each layer documented in the data schema and the data dictionary;

  - outline the technical processes for data extraction, staging, data verification, cleansing, consolidation and delivery; and

  - address the policies and procedures governing each of the objects/elements defined in the schema.

- *The Deployment of an On-going Operation and Maintenance Strategy*

  - outline the short and long term data management objectives of the enterprise, the strategic plan to attain those objectives, the obstacles that may impede the attainment of the objectives and performance indicators to measure performance to the objectives;

  - document a strategy for future planning, forecasting and budgeting for the warehouse and the on-going management of each layer in the enterprise with particular emphasis on data integration and integrity;

  - document a process for future resource and staffing consideration, to include planning, forecasting and budgeting for the warehouse;

  - document the department's staffing roles associated within each layer of a multi-tier infrastructure;

  - document the support processes required to maximize the reliability of the infrastructure; and

  - document the training processes required to ensure that stakeholders are able to leverage the investment in the data warehouse to its fullest extent.

- *The Pilot Deployment of an Enterprise -wide Persistent Data Facility*

  Using the layers outlined in the Data Management Schema and Specification, build a pilot persistent data facility. The pilot will adopt the "lessons learned/proof of concept" approach and validate the schema and specification while mitigating the risks associated with full deployment. It will also serve as a way to build credibility and support for the data warehouse initiative.

The pilot will be a short-term 60 to 90 day project and will include the following:

- The deployment of a scaled-down version of the data warehouse architecture in a single technical environment;
- The utilization of standard data warehouse tools;
- A multi-tier infrastructure for each layer;
- The implementation of a scaled-down data acquisition plan from two sources; and
- The implementation of a scaled-down data delivery plan from an object considered value-added or of high priority.

- *The Deployment of an Enterprise -wide Persistent Data Facility*

  Using the documented best practices gained from the pilot and each of the developed components listed above, produce a Request For Proposal (RFP) for the construction and deployment of an enterprise-wide persistent data facility. The initial deliverables will be comprised of the following:

  - The re-engineering of the Education Directory to include a temporary, operational and persistent data mart. The redesigned directory will be the source of all entities within the enterprise;
  - A temporary, operational and persistent data mart for the Student ID database (PSIS);
  - An Assessment Score data mart to facilitate Annual Yearly Progress (AYP) analysis and the dissemination of No Child Left Behind Reports;
  - An Assessment Released Item data mart; and
  - A Curriculum Frameworks data mart.

Connecticut will make the source code and/or documentation of these deliverables available to any state or educational entity who may find value in the chosen approach.

3) The Development of Data Marts, Facing Applications and Decision Support Cubes to Disseminate Data from the Persistent Data Stores to the LEA, School, Student, Parent and Public Level

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Curriculum Frameworks, Formative Assessment and State Assessment Released Item Database	1	(b)(4)		
Enhance Functionality of the Education Directory	2			
Enhance Functionality of Assessment Results Database	2			
No Child Left Behind (NCLB) Database	2			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

Using the upgraded data facilities (as outlined in Component 2), the department will re-engineer existing databases to provide more streamlined data collections, more reliable data, and an infrastructure designed to securely share those data with LEA staff, the research community, other state agencies, collaborating states and the USDE.

The engineering/re-engineering process for each project outlined below will begin with the writing of business and functional requirements for each tier of the database. The requirements will be developed and documented in an industry standard case tool, relying on Joint Application Development (JAD) strategies to facilitate participation among the NCLB stakeholders. Connecticut will make the source code and/or documentation of these projects available to any state or educational entity who may find value in the chosen approach. The end result of the requirements documents will be a Request for Proposal for each component.

Included in each phase is the construction, the data loading and security integration of each data store.

- *Enhance the Education Directory* – At present the department maintains a SQL/web-based directory deployed to each LEA to manage staff and facility data. The directory was built on a limited budget and though it has streamlined data entry by providing access to the LEA, it has flaws inherent in the design. The primary focus will be to enhance the current database structure to tie into the Microsoft Active Directory and provide the following functionality:

    - build a Directory Administration (DA) function tied to MS Active Directory and deployed to department staff with the authority to recognize and validate entities within the enterprise;

    - build a DA function allowing LEA staff to provide information about those entities; and

    - build a DA function deployed to both department and LEA authorized staff for provisioning network identity and passwords to users with the entities.

- *Assessment Results Database* – With the advent of the student identifier (SASID), it will be possible to relate the scores from a state assessment to specific collection data to student demographic data. The state has two assessments: the Connecticut Mastery Test (CMT) which is administered to students in grades 4, 6, and 8; and The Connecticut Academic Performance Test (CAPT) administered to students in grade 10. Beginning in 2006 the CMT will be expanded to include the testing of students in grades 3, 5 and 7.

  The database would enhance our existing assessment results dissemination website contracted to eMetric Solutions and disseminated through the www.CTReports.com website. The assessment results data are currently disseminated to teachers in paper form but by means of this application, would be presented in secure web form.

  Since state assessment scores hold the key to NCLB accountability, SEA and LEA decision making and policy, and program research, the department will build a secure data mart designed to store assessment data and provide the following functionality:

    - development of temporary, operational and persistent data marts for assessment scores and item-level responses for each student tested in Connecticut;

- a link to the Education Directory to ensure assessment scores are related to the accountable LEA;
- a link to the Public School Information System (PSIS) to ensure assessment scores are related to the appropriate student;
- through a security portal, provide student-level assessment data for review by the appropriate LEA staff whose roles are identified in the LDAP security framework;
- through a security portal, pilot a parent dissemination assessment score website;
- provide the linkage of assessment scores to existing databases such as the English Language Learner, Disciplinary Offense and Special Education databases; and
- provide the linkage of de-identified assessment scores and student demographics to the research community.

- *No Child Left Behind (NCLB) Database* – Using the Assessment Results data marts and the link to PSIS, the department's Accountability Unit in the Bureau of Research, Evaluation and Student Assessment will be provided a database with the following functionality:
  - data drawn from persistent sources (PSIS and Assessment Results) and updated in a timely manner to facilitate AYP analysis;
  - a secure database deployed to the appropriate LEA staff allowing the user to reconcile test-takers, and the demographics of those test-takers, accountable to their respective LEA;
  - the electronic dissemination of NCLB school and district reports to authorized LEA staff;
  - the development of an electronic appeal process using the Active Directory messaging interface to facilitate threaded communication from the LEA to SEA;
  - the development of secure decision support cubes deployed to SEA and LEA staff to analyze and disseminate accountability data; and
  - the development public decision support cubes to analyze and disseminate accountability data through the department's CEDAR website.

- *Curriculum Frameworks, Formative Assessment and State Assessment Released Item Database* – The department will deploy a persistent data layer of published Curriculum Frameworks, formative test items and released items from CMT and CAPT. The database will provide the following functionality:

    - augment the current Curriculum Framework website (www.CtCurriculum.org) by applying an indexing convention for each level (strand, content standard, etc.) of the existing frameworks;

    - the conversion of the existing frameworks into the database architecture;

    - the loading of the existing frameworks into the database;

    - the development of a secure, web-based interface, deployed at the SEA and LEA, to maintain the framework database;

    - the development of a secure web-based interface, deployed at the SEA and LEA, to jury new generations of frameworks;

    - facilitate the linkage of a Curriculum Framework data mart to a formative assessment and released assessment item bank;

    - provide for the correlation of specific curricula in the framework application to formative and released assessment items and lesson plans/tasks;

    - provide SIF enabled and traditional export functionality of the content provided in the framework application; and

    - provide enhanced query and analysis cubes for searching and reporting on the content provided in the framework application.

4) Participation in a collaborative with the University of Connecticut Health Center, to develop a longitudinal research data warehouse, federating de-identified data from the Connecticut Departments of: Education; Children and Families; Public Health; and Mental Retardation

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Identification of data for sharing, data loading, participation in model network.	1	(b)(4)		
Participation in developing Institutional Review Board protocols, development of facing decision support cubes and enhanced administrative functionality.	2			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

Connecticut has invested vast resources over the past few decades collecting and maintaining information relevant to the health and well-being of its citizens. This information, however, currently resides in more than a dozen separate state agencies, each having independent missions, governance, and technological infrastructure. For example, health surveillance data (i.e., immunizations, lead screening), healthcare utilization data, documentation of child custody and support services, and data on developmental outcomes and academic achievement reside in the Departments of Public Health, Social Services, Children and Families, and Education, respectively.

Connecticut intends to address this problem through a collaboration involving the University of Connecticut and the State's executive branch agencies. Government partners in Stage I of this initiative include the Departments of Public Health, Education, Children and Families, and Mental Retardation. Stage I has been funded by the University of Connecticut (UCONN), and the requested grant amount allocated by the Statewide Longitudinal Data System Grant will be to support the Department of Education's participation in this effort. The typical analysis and development cost of the specific deliverables will be leveraged by using resources at UCONN, and will include the identification of requisite data, data formats and the development of data sharing protocols, agents and interfaces.

5) Collaboration with Arizona and Maine to develop SIF Zones and SIF agents to pilot horizontal and vertical reporting models

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
The development of a SIF Zone	2	(b)(4)		
The Hardware Necessary to Deploy a SIF Zone	2			
The Deployment of the SIF Zone	2			
The Specification of SIF Vertical Agents	2			
The Specification of SIF Horizontal Agents	2			
Travel	2			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

In order to leverage the costs associated with development, Connecticut is planning a collaborative effort with the Arizona and Maine Departments of Education to develop SIF vertical and horizontal reporting models. The three states are using a common architecture, .NET and SQL, thus a relationship would commence that would facilitate the sharing of analysis and code among our states, not only during the development process, but more importantly long after the grant funding has expired.

The deliverables from the development collaborative will include:

- the development of a SIF Zone Integration Server to more efficiently manage the process of collecting and validating the data submitted by the LEA;
- the development of SIF agents to federate vertical data transmission from two pilot LEAs to the SEA;

- the development of SIF agents to pilot a state-to-state horizontal reporting model;
- the development SIF agents to pilot a state-to-USDE vertical reporting model capable of meeting the reporting requirements of the Education Data Exchange Network;
- The definition of policies and procedures to jury the functionality of SIF.

6) Provide training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning.

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Provide training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning	2	n/a	n/a	(b)(4)
Continue training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning	3	n/a	n/a	
Year Two Total:		-	-	
Year Three Total:		n/a	n/a	
Project Component Total:		n/a	n/a	

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

The most undervalued component of any systems deployment is the training of users to appropriately utilize the new or enhanced functionality. Many data warehouse projects fail to correlate data prior to the loading of persistent data stores, thus users are able to draw misguided conclusions on data that are not comparable.

The enhancements realized as part of the Statewide Longitudinal Data System grant will now allow Connecticut to present its content within the framework of state-of-the-art architecture; however, this endeavor will only be successful if the intended host of users can securely access and appropriately disseminate the data presented.

Thus, training will be offered to enterprise users on the following:

- how to use the data dictionary for consistent definition of the elements related to specific roles within the enterprise;
- how to best utilize decision support cubes;

- how to query the data warehouse;
- how to validate and interpret their findings with SEA researchers; and
- how to present their findings to their constituents.

Training will additionally be offered to enterprise staff with specific password provisioning roles in the use of identity management software.

Training materials and best practices will also be disseminated via a website.

g. **Budget Justification for Components Addressed Through This Grant**

1) Collaboration with Arizona and Maine to Develop a Data Dictionary to Serve as a Conclusive Meta-Library for Elements Collected on Behalf of the Department

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Research, Analysis, Documentation and Authoring of Data Dictionary	1	(b)(4)		
Development, Pilot, Content Loading and Deployment of Case Management Tools and Service Registries	1			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

The Connecticut State Department of Education is planning a collaborative with the Departments of Education in Arizona and Maine to develop a Data Dictionary. The dictionary will be a conclusive meta-library for each element collected by the department and will provide consistent definitions for district users and School Information System (SIS) vendors.

This component is considered the highest priority in this grant application. The dictionary will be the sole reference source for data warehouse architecture and at minimum it will provide the following metadata on each element collected:

- element name;
- data type;
- security classification;
- related elements;
- code formats;
- Education Data Exchange Network (EDEN) crosswalks;
- Common Core of Data (CCD) crosswalks;
- SIF and NCES metadata crosswalks;
- ISO/IEC 11179 and Dublin Core metadata specifications;

- inter-element validation details;
- database table references;
- application domain definitions;
- data sources;
- historical and external references;
- quality control references;
- local, state and federal policy references;
- validity dates; and
- entity/user LDAP relationships.

The dictionary will document each element using an indexing convention and be housed in a case management application. The case management application will provide create, read, update and delete functionality to facilitate the maintenance of the dictionary. The case management application will also include the following registry services:

- *Data Sources & Services Registry* – This registry will provide a searchable directory of data sources, agency contacts, and services available within the enterprise. It will provide descriptive information about the data sources to end-users searching the registry and serve as the authoritative source for services (i.e. the data processing engine) looking for connection information to those data sources; and

- *Data Elements Registry* – The registry will house the published data definitions contributed by each data source. It will provide the definitions as a searchable catalog, as well as organize data definitions hierarchically for browsing. The Connecticut Education Data and Research (CEDAR) interface will use this data definitions catalog for building query statements. The registry will integrate the data definitions catalog with standardized vocabularies.

g. **Budget Justification for Components Addressed Through This Grant**

2) The Specification and Development of an Enterprise-wide Persistent Data Storage Facility

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Enterprise-wide Data Management Schema	1	(b)(4)		
Enterprise-wide Data Management Specification	1			
The Deployment of an On-going Operation and Maintenance Strategy	1			
The Pilot Deployment of an Enterprise-wide Persistent Data Storage Facility	1			
The Deployment of an Enterprise-wide Persistent Data Storage Facility	2			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

Using the data dictionary as a guiding document, the department will architect and build a persistent data layer to fulfill the requirements of a data warehouse. The components of this activity are as follows:

- *Enterprise-wide Data Management Schema* – The schema will:
  - be developed and documented in an industry standard case tool and rely on Joint Application Development (JAD) strategies to facilitate participation among the stakeholders in the enterprise;
  - be presented in both a traditional schema metaphor for each relational layer and a STAR or consolidated dimensional hierarchy for the persistent layers; and

- identify the requisite objects and elements and document their relation and inter-dependency to the data storage, domain object, presentation and persistent layers.

- *Enterprise-wide Data Management Specification* – The specification will:

  - define the business and functional requirements of each layer documented in the data schema and the data dictionary;

  - outline the technical processes for data extraction, staging, data verification, cleansing, consolidation and delivery; and

  - address the policies and procedures governing each of the objects/elements defined in the schema.

- *The Deployment of an On-going Operation and Maintenance Strategy*

  - outline the short and long term data management objectives of the enterprise, the strategic plan to attain those objectives, the obstacles that may impede the attainment of the objectives and performance indicators to measure performance to the objectives;

  - document a strategy for future planning, forecasting and budgeting for the warehouse and the on-going management of each layer in the enterprise with particular emphasis on data integration and integrity;

  - document a process for future resource and staffing consideration, to include planning, forecasting and budgeting for the warehouse;

  - document the department's staffing roles associated within each layer of a multi-tier infrastructure;

  - document the support processes required to maximize the reliability of the infrastructure; and

  - document the training processes required to ensure that stakeholders are able to leverage the investment in the data warehouse to its fullest extent.

- *The Pilot Deployment of an Enterprise -wide Persistent Data Facility*

  Using the layers outlined in the Data Management Schema and Specification, build a pilot persistent data facility. The pilot will adopt the "lessons learned/proof of concept" approach and validate the

schema and specification while mitigating the risks associated with full deployment. It will also serve as a way to build credibility and support for the data warehouse initiative.

The pilot will be a short-term 60 to 90 day project and will include the following:

- The deployment of a scaled-down version of the data warehouse architecture in a single technical environment;
- The utilization of standard data warehouse tools;
- A multi-tier infrastructure for each layer;
- The implementation of a scaled-down data acquisition plan from two sources; and
- The implementation of a scaled-down data delivery plan from an object considered value-added or of high priority.

- *The Deployment of an Enterprise -wide Persistent Data Facility*

Using the documented best practices gained from the pilot and each of the developed components listed above, produce a Request For Proposal (RFP) for the construction and deployment of an enterprise-wide persistent data facility. The initial deliverables will be comprised of the following:

- The re-engineering of the Education Directory to include a temporary, operational and persistent data mart. The redesigned directory will be the source of all entities within the enterprise;
- A temporary, operational and persistent data mart for the Student ID database (PSIS);
- An Assessment Score data mart to facilitate Annual Yearly Progress (AYP) analysis and the dissemination of No Child Left Behind Reports;
- An Assessment Released Item data mart; and
- A Curriculum Frameworks data mart.

Connecticut will make the source code and/or documentation of these deliverables available to any state or educational entity who may find value in the chosen approach.

g. **Budget Justification for Components Addressed Through This Grant**

3) The Development of Data Marts, Facing Applications and Decision Support Cubes to Disseminate Data from the Persistent Data Stores to the LEA, School, Student, Parent and Public Level

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Curriculum Frameworks, Formative Assessment and State Assessment Released Item Database	1			
Enhance Functionality of the Education Directory	2			
Enhance Functionality of Assessment Results Database	2			
No Child Left Behind (NCLB) Database	2			
Year One Total:				
Year Two Total:				
Project Component Total:				

(b)(4)

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

Using the upgraded data facilities (as outlined in Component 2), the department will re-engineer existing databases to provide more streamlined data collections, more reliable data, and an infrastructure designed to securely share those data with LEA staff, the research community, other state agencies, collaborating states and the USDE.

The engineering/re-engineering process for each project outlined below will begin with the writing of business and functional requirements for each tier of the database. The requirements will be developed and documented in an industry standard case tool, relying on Joint Application Development (JAD) strategies to facilitate participation among the NCLB stakeholders. Connecticut will make the source code and/or documentation of these projects available to any state or educational entity

who may find value in the chosen approach. The end result of the requirements documents will be a Request for Proposal for each component.

Included in each phase is the construction, the data loading and security integration of each data store.

- *Enhance the Education Directory* – At present the department maintains a SQL/web-based directory deployed to each LEA to manage staff and facility data. The directory was built on a limited budget and though it has streamlined data entry by providing access to the LEA, it has flaws inherent in the design. The primary focus will be to enhance the current database structure to tie into the Microsoft Active Directory and provide the following functionality:

    - build a Directory Administration (DA) function tied to MS Active Directory and deployed to department staff with the authority to recognize and validate entities within the enterprise;

    - build a DA function allowing LEA staff to provide information about those entities; and

    - build a DA function deployed to both department and LEA authorized staff for provisioning network identity and passwords to users with the entities.

- *Assessment Results Database* – With the advent of the student identifier (SASID), it will be possible to relate the scores from a state assessment to specific collection data to student demographic data. The state has two assessments: the Connecticut Mastery Test (CMT) which is administered to students in grades 4, 6, and 8; and The Connecticut Academic Performance Test (CAPT) administered to students in grade 10. Beginning in 2006 the CMT will be expanded to include the testing of students in grades 3, 5 and 7.

  The database would enhance our existing assessment results dissemination website contracted to eMetric Solutions and disseminated through the www.CTReports.com website. The assessment results data are currently disseminated to teachers in paper form but by means of this application, would be presented in secure web form.

  Since state assessment scores hold the key to NCLB accountability, SEA and LEA decision making and policy, and program research, the department will build a secure data mart designed to store assessment data and provide the following functionality:

- development of temporary, operational and persistent data marts for assessment scores and item-level responses for each student tested in Connecticut;
- a link to the Education Directory to ensure assessment scores are related to the accountable LEA;
- a link to the Public School Information System (PSIS) to ensure assessment scores are related to the appropriate student;
- through a security portal, provide student-level assessment data for review by the appropriate LEA staff whose roles are identified in the LDAP security framework;
- through a security portal, pilot a parent dissemination assessment score website;
- provide the linkage of assessment scores to existing databases such as the English Language Learner, Disciplinary Offense and Special Education databases; and
- provide the linkage of de-identified assessment scores and student demographics to the research community.

- *No Child Left Behind (NCLB) Database* – Using the Assessment Results data marts and the link to PSIS, the department's Accountability Unit in the Bureau of Research, Evaluation and Student Assessment will be provided a database with the following functionality:
  - data drawn from persistent sources (PSIS and Assessment Results) and updated in a timely manner to facilitate AYP analysis;
  - a secure database deployed to the appropriate LEA staff allowing the user to reconcile test-takers, and the demographics of those test-takers, accountable to their respective LEA;
  - the electronic dissemination of NCLB school and district reports to authorized LEA staff;
  - the development of an electronic appeal process using the Active Directory messaging interface to facilitate threaded communication from the LEA to SEA;

- the development of secure decision support cubes deployed to SEA and LEA staff to analyze and disseminate accountability data; and

- the development public decision support cubes to analyze and disseminate accountability data through the department's CEDAR website.

- *Curriculum Frameworks, Formative Assessment and State Assessment Released Item Database* – The department will deploy a persistent data layer of published Curriculum Frameworks, formative test items and released items from CMT and CAPT. The database will provide the following functionality:

  - augment the current Curriculum Framework website (www.CtCurriculum.org) by applying an indexing convention for each level (strand, content standard, etc.) of the existing frameworks;

  - the conversion of the existing frameworks into the database architecture;

  - the loading of the existing frameworks into the database;

  - the development of a secure, web-based interface, deployed at the SEA and LEA, to maintain the framework database;

  - the development of a secure web-based interface, deployed at the SEA and LEA, to jury new generations of frameworks;

  - facilitate the linkage of a Curriculum Framework data mart to a formative assessment and released assessment item bank;

  - provide for the correlation of specific curricula in the framework application to formative and released assessment items and lesson plans/tasks;

  - provide SIF enabled and traditional export functionality of the content provided in the framework application; and

  - provide enhanced query and analysis cubes for searching and reporting on the content provided in the framework application.

4) Participation in a collaborative with the University of Connecticut Health Center, to develop a longitudinal research data warehouse, federating de-identified data from the Connecticut Departments of: Education; Children and Families; Public Health; and Mental Retardation

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Identification of data for sharing, data loading, participation in model network.	1	(b)(4)		
Participation in developing Institutional Review Board protocols, development of facing decision support cubes and enhanced administrative functionality.	2			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

Connecticut has invested vast resources over the past few decades collecting and maintaining information relevant to the health and well-being of its citizens. This information, however, currently resides in more than a dozen separate state agencies, each having independent missions, governance, and technological infrastructure. For example, health surveillance data (i.e., immunizations, lead screening), healthcare utilization data, documentation of child custody and support services, and data on developmental outcomes and academic achievement reside in the Departments of Public Health, Social Services, Children and Families, and Education, respectively.

Connecticut intends to address this problem through a collaboration involving the University of Connecticut and the State's executive branch agencies. Government partners in Stage I of this initiative include the Departments of Public Health, Education, Children and Families, and Mental Retardation. Stage I has been funded by the University of Connecticut (UCONN), and the requested grant amount allocated by the Statewide Longitudinal Data System Grant will be to support the Department of Education's participation in this effort. The typical analysis and development cost of the specific deliverables will be leveraged by using resources at UCONN, and will include the identification of requisite data, data formats and the development of data sharing protocols, agents and interfaces.

5) Collaboration with Arizona and Maine to develop SIF Zones and SIF agents to pilot horizontal and vertical reporting models

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
The development of a SIF Zone	2	(b)(4)		
The Hardware Necessary to Deploy a SIF Zone	2			
The Deployment of the SIF Zone	2			
The Specification of SIF Vertical Agents	2			
The Specification of SIF Horizontal Agents	2			
Travel	2			
Year One Total:				
Year Two Total:				
Project Component Total:				

** Calculated at the State of Connecticut IT consultant rate of $85. per hour*

Justification/Description of Component Deliverable

In order to leverage the costs associated with development, Connecticut is planning a collaborative effort with the Arizona and Maine Departments of Education to develop SIF vertical and horizontal reporting models. The three states are using a common architecture, .NET and SQL, thus a relationship would commence that would facilitate the sharing of analysis and code among our states, not only during the development process, but more importantly long after the grant funding has expired.

The deliverables from the development collaborative will include:

- the development of a SIF Zone Integration Server to more efficiently manage the process of collecting and validating the data submitted by the LEA;

- the development of SIF agents to federate vertical data transmission from two pilot LEAs to the SEA;
- the development of SIF agents to pilot a state-to-state horizontal reporting model;
- the development SIF agents to pilot a state-to-USDE vertical reporting model capable of meeting the reporting requirements of the Education Data Exchange Network;
- The definition of policies and procedures to jury the functionality of SIF.

6) Provide training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning.

Budget

Project Component Deliverable	Project Year	Hours	7 Hour Days	Projected Cost*
Provide training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning	2	n/a	n/a	(b)(4)
Continue training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning	3	n/a	n/a	
Year Two Total:		-	-	
Year Three Total:		n/a	n/a	
Project Component Total:		n/a	n/a	

Justification/Description of Component Deliverable

The most undervalued component of any systems deployment is the training of users to appropriately utilize the new or enhanced functionality. Many data warehouse projects fail to correlate data prior to the loading of persistent data stores, thus users are able to draw misguided conclusions on data that are not comparable.

The enhancements realized as part of the Statewide Longitudinal Data System grant will now allow Connecticut to present its content within the framework of state-of-the-art architecture; however, this endeavor will only be successful

if the intended host of users can securely access and appropriately disseminate the data presented.

Thus, training will be offered to enterprise users on the following:

- how to use the data dictionary for consistent definition of the elements related to specific roles within the enterprise;
- how to best utilize decision support cubes;
- how to query the data warehouse;
- how to validate and interpret their findings with SEA researchers; and
- how to present their findings to their constituents.

Training will additionally be offered to enterprise staff with specific password provisioning roles in the use of identity management software.

Training materials and best practices will also be disseminated via a website.

h. timelines

1) Collaboration with Arizona and Maine to Develop a Data Dictionary to Serve as a Conclusive Meta-Library for Elements Collected on Behalf of the Department

Project Component Deliverable	Days	Start/Finish
Drafting of RFP Language for the Data Dictionary		
Submitting Dictionary Component RFP for Bid		
Research, Analysis, Documentation and Authoring of Data Dictionary		
Development, Pilot, Content Loading and Deployment of Case Management Tools and Service Registries		

(b)(4)

2) The Specification and Development of an Enterprise-wide Persistent Data Storage Facility

Project Component Deliverable	Days	Start/Finish
Drafting of RFP Language for the Enterprise-wide Schema and Specification and On-going Operation and Maintenance Strategy	30	04/06 – 05/06
Submitting Enterprise-wide Schema and Specification and On-going Operation and Maintenance Strategy Component RFP for Bid	60	05/06 – 06/06
Schema Analysis and Development	49	07/06 – 08/06
Enterprise-wide Data Management Specification	71	08/06 – 10/06
On-going Operation and Maintenance Strategy	30	09/06 – 10/06
Drafting of RFP Language for the Pilot and Deployment of an Enterprise-wide Persistent Data Storage Facility	45	11/06 – 12/06
Submitting RFP for Pilot and Deployment of an Enterprise-wide Persistent Data Storage Facility	60	12/06 – 01/07
The Pilot and Deployment of an Enterprise-wide Persistent Data Storage Facility	857	02/07 – 11/07

3) **The Development of Data Marts, Facing Applications and Decision Support Cubes to Disseminate Data from the Persistent Data Stores to the LEA, School, Student, Parent and Public Level**

Project Component Deliverable	Days	Start/Finish
Drafting of RFP Language for the Curriculum Frameworks, Formative Assessment, Released Item, Education Directory, NCLB/AYP, and Assessment Results Databases	45	02/07 – 03/07
Submitting Curriculum Frameworks, Formative Assessment, Released Item, Education Directory, NCLB/AYP, and Assessment Results Database RFP for Bid	60	03/07 – 04/07
Development and Deployment of the Curriculum Frameworks, Formative Assessment, Released Item, Education Directory, NCLB/AYP, and Assessment Results Database Databases	252	05/07 – 11/07

4) **Participation in a collaborative with the University of Connecticut Health Center, to develop a longitudinal research data warehouse, federating de-identified data from the Connecticut Departments of: Education; Children and Families; Public Health; and Mental Retardation**

Project Component Deliverable	Days	Start/Finish
Identification of data for sharing, data loading, participation in model network.	56	05/06 – 07/06
Participation in developing Institutional Review Board protocols, development of facing decision support cubes and enhanced administrative functionality.	56	02/07 – 05/07

5) Collaboration with Arizona and Maine to develop SIF Zones and SIF agents to pilot horizontal and vertical reporting models

Project Component Deliverable	Days	Start/Finish
Drafting of RFP Language for the development and deployment of a SIF Zone and the Integration of Vertical and Horizontal Agents	30	02/07 – 03/07
Submitting the RFP for the development and deployment of a SIF Zone and the Integration of Vertical and Horizontal Agents	60	03/07 – 04/07
The Deployment and Development of a SIF Zone and the Integration of Vertical and Horizontal Agents	200	05/07 – 09/07

6) Provide training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning.

Project Component Deliverable	Days	Start/Finish
Provide training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning	To Be Determined	As Needed
Continue training to LEA staff on the appropriate use of persistent data, decision support tools, identity management and password provisioning	To Be Determined	As Needed